

	Type	L #	Hits	Search Text	DBs	Time Stamp
1	BRS	L1	1	software and multi and user and license and (license near manager) and (network or networked)	EPO; JPO; DERWEN T	2001/10/30 16:04
2	BRS	FAMILY	1	US-5742757-A.DID.	DERWEN T	2001/10/30 16:04
3	BRS	L3	0	software and multi and user and license and (license near manager) and (partition or partioned)	EPO; JPO; DERWEN T	2001/10/30 16:04
4	BRS	L4	0	software and multi and user and license and (partition or partioned)	EPO; JPO; DERWEN T	2001/10/30 16:05
5	BRS	L5	425	virtual near computer	USPAT	2001/10/30 16:05
6	BRS	L6	14	5 and software and license	USPAT	2001/10/30 16:12
7	BRS	L7	6	5 and software and license and manager	USPAT	2001/10/30 16:12

Considered all

Considered all

	Type	L #	Hits	Search Text	DBs	Time Stamp
1	IS&R	L1	16	((("3641505") or ("4511964") or ("4843541") or ("5129088") or ("5253344") or ("5263158") or ("5345590") or ("5574914") or ("5600805") or ("5659756") or ("5659786") or ("5671405") or ("5675791") or ("5687363") or ("5692174") or ("5692182"))).PN.	USPAT	2001/10/30 15:43
2	IS&R	L2	3	((("5566337") or ("5828882") or ("5845146"))).PN.	USPAT	2001/10/30 15:46
3	IS&R	L3	4	((("5684974") or ("5923890") or ("5996026") or ("6148323"))).PN.	USPAT	2001/10/30 15:54
4	BRS	L4	0	(1 or 2 or 3) and concurrent and multi and user and software and license and manager and (network or networked)	USPAT	2001/10/30 15:57
5	BRS	L5	0	(1 or 2 or 3) and concurrent and multi and user and software and license and manager	USPAT	2001/10/30 15:57
6	BRS	L6	0	(1 or 2 or 3) and concurrent and user and software and license and manager	USPAT	2001/10/30 15:57
7	BRS	L7	0	(1 or 2 or 3) and software and license and manager	USPAT	2001/10/30 15:58
8	BRS	L8	0	(1 or 2 or 3) and software and license	USPAT	2001/10/30 15:58
9	BRS	L9	17	(1 or 2 or 3) and software	USPAT	2001/10/30 15:58
10	BRS	L10	14	(1 or 2 or 3) and software and (partition or partitioned)	USPAT	2001/10/30 15:58 <i>considered all</i>
11	BRS	L11	3	software and multi and user and license and (license near manager) and (network or networked) and (partition or partitioned)	USPAT	2001/10/30 15:59 <i>considered all</i>

	Type	L #	Hits	Search Text	DBs	Time Stamp
1	BRS	L1	19	software and multi and user and license and (license near manager) and (network or networked)	USPAT	2001/10/30 12:51
2	IS&R	L2	200	("705/51").CCLS.	USPAT	2001/10/30 12:51

*considered
OK*

Status: Path 1 of [Dialog Information Services via Modem]

Status: Initializing TCP/IP using (UseTelnetProto 1 ServiceID pto-dialog)
Trying 3106900061...Open

DIALOG INFORMATION SERVICES
PLEASE LOGON:

***** HHHHHHHH SSSSSSSS?

Status: Signing onto Dialog

ENTER PASSWORD:

***** HHHHHHHH SSSSSSSS?lfq0hprh *****

Welcome to DIALOG

Status: Connected

Dialog level 01.10.01D

Last logoff: 24oct01 14:05:49
Logon file405 31oct01 08:45:01

*** ANNOUNCEMENT ***

--Important Notice to Freelance Authors--
See HELP FREELANCE for more information

NEW FILES RELEASED

***Disclosure Database (File 101)
***Harris Business Profiler (File 537)
***Mergent Company Profiles (File 555)
***Mergent Company Snapshots (File 556)
***Mergent Company News Reports (File 557)
***Financial Times Fulltext (File 476)

***TRADEMARKSCAN-Japan (File 669)

UPDATING RESUMED

***Delphes European Business (File 481)
***Books In Print (File 470)

RELOADED

***CLAIMS/US PATENTS (Files 340, 341, 942)
***Kompass Middle East/Africa/Mediterranean (File 585)
***Kompass Asia/Pacific (File 592)
***Kompass Central/Eastern Europe (File 593)
***Kompass Canada (File 594)
***CANCERLIT (File 159)
***Information Science Abstracts (File 202)

New document supplier

IMED has been changed to INFOTRIE (see HELP OINFOTRI)

>>>Get immediate news with Dialog's First Release
news service. First Release updates major newswire
databases within 15 minutes of transmission over the
wire. First Release provides full Dialog searchability
and full-text features. To search First Release files in
OneSearch simply BEGIN FIRST for coverage from Dialog's
broad spectrum of news wires.

>>> Enter BEGIN HOMEBASE for Dialog Announcements <<<
>>> of new databases, price changes, etc. <<<

COREFULL is set ON as an alias for 15,9,623,810,275,624,636,621,813,16,160,148,20.
COREABS is set ON as an alias for 77,35,593,65,2,233,99,473,474,475.
COREALL is set ON as an alias for COREFULL,COREABS.

SOFTFULL is set ON as an alias for 278,634,256.
 EUROFULL is set ON as an alias for 348,349.
 JAPOABS is set ON as an alias for 347.
 HEALTHFULL is set ON as an alias for 442,149,43,444.
 HEALTHABS is set ON as an alias for 5,73,151,155,34,434.
 DRUGFULL is set ON as an alias for 455,129,130.
 DRUGABS is set ON as an alias for 74,42.
 INSURANCEFULL is set ON as an alias for 625,637.
 INSURANCEABS is set ON as an alias for 169.
 TRANSPORTFULL is set ON as an alias for 80,637.
 TRANSPORTABS is set ON as an alias for 108,6,63.
 ADVERTISINGFULL is set ON as an alias for 635,570,PAPERSMJ,PAPERSEU.
 INVENTORYABS is set ON as an alias for 8,14,94,6,34,434,7.
 BANKINGFULL is set ON as an alias for 625,268,626,267.
 BANKINGABS is set ON as an alias for 139.
 HEALTHALL is set ON as an alias for COREFULL,COREABS,HEALTHFULL,HEALTHABS.
 INSURANCEALL is set ON as an alias for COREFULL,COREABS,INSURANCEFULL,INSURANCEABS.
 RESERVATIONALL is set ON as an alias for COREFULL, COREABS.
 OPERATIONSALL is set ON as an alias for COREFULL,COREABS,INVENTORYABS.
 TRANSPORTALL is set ON as an alias for COREFULL,COREABS,TRANSPORTFULL,TRANSPORTABS.
 ADVERTISINGALL is set ON as an alias for COREFULL,COREABS,ADVERTISINGFULL.
 SHOPPINGALL is set ON as an alias for COREFULL,COREABS,ADVERTISINGALL,47.
 INVENTORYALL is set ON as an alias for COREFULL,COREABS,INVENTORYFULL.
 BANKINGALL is set ON as an alias for COREFULL,COREABS,BANKINGFULL,BANKINGABS.
 PORTFOLIOALL is set ON as an alias for COREFULL,COREABS,BANKINGALL.
 TRADINGALL is set ON as an alias for COREFULL,COREABS,BANKINGALL.
 CREDITALL is set ON as an alias for COREFULL,COREABS,BANKINGALL.
 FUNDSALL is set ON as an alias for COREFULL,COREABS,BANKINGALL,608.
 SYSTEM:HOME
 Cost is in DialUnits
 Menu System II: D2 version 1.7.8 term=ASCII
 *** DIALOG HOMEBASE(SM) Main Menu ***

Information:

1. Announcements (new files, reloads, etc.)
2. Database, Rates, & Command Descriptions
3. Help in Choosing Databases for Your Topic
4. Customer Services (telephone assistance, training, seminars, etc.)
5. Product Descriptions

Connections:

6. DIALOG(R) Document Delivery
7. Data Star(R)

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/H = Help /L = Logoff /NOMENU = Command Mode

Enter an option number to view information or to connect to an online
 service. Enter a BEGIN command plus a file number to search a database
 (e.g., B1 for ERIC).
 ?b coreabs, corefull

```

3loct01 08:45:13 User242933 Session D70.1
$0.00      0.229 DialUnits FileHomeBase
$0.00 Estimated cost FileHomeBase
$0.01 TYMNET
$0.01 Estimated cost this search
$0.01 Estimated total session cost 0.229 DialUnits
  
```

SYSTEM:OS - DIALOG OneSearch

File 77:Conference Papers Index 1973-2001/Nov
 (c) 2001 Cambridge Sci Abs
 File 35:Dissertation Abs Online 1861-2001/Oct
 (c) 2001 ProQuest Info&Learning

File 593:KOMPASS Central/Eastern Europe 2001/Sep
(c) 2001 KOMPASS Intl.
File 65:Inside Conferences 1993-2001/Oct W4
(c) 2001 BLDSC all rts. reserv.
***File 65: For variance in UDs please see Help News65.**
File 2:INSPEC 1969-2001/Oct W4
(c) 2001 Institution of Electrical Engineers
File 233:Internet & Personal Comp. Abs. 1981-2001/Oct
(c) 2001 Info. Today Inc.
File 99:Wilson Appl. Sci & Tech Abs 1983-2001/Sep
(c) 2001 The HW Wilson Co.
File 473:FINANCIAL TIMES ABSTRACTS 1998-2001/APR 02
(c) 2001 THE NEW YORK TIMES
***File 473: This file will not update after March 31, 2001.**
It will remain on Dialog as a closed file.
File 474:New York Times Abs 1969-2001/Oct 29
(c) 2001 The New York Times
File 475:Wall Street Journal Abs 1973-2001/Oct 29
(c) 2001 The New York Times
File 15:ABI/Inform(R) 1971-2001/Oct 30
(c) 2001 ProQuest Info&Learning
File 9:Business & Industry(R) Jul/1994-2001/Oct 30
(c) 2001 Resp. DB Svcs.
File 623:Business Week 1985-2001/Oct 31
(c) 2001 The McGraw-Hill Companies Inc
File 810:Business Wire 1986-1999/Feb 28
(c) 1999 Business Wire
File 275:Gale Group Computer DB(TM) 1983-2001/Oct 29
(c) 2001 The Gale Group
File 624:McGraw-Hill Publications 1985-2001/Oct 29
(c) 2001 McGraw-Hill Co. Inc
File 636:Gale Group Newsletter DB(TM) 1987-2001/Oct 25
(c) 2001 The Gale Group
File 621:Gale Group New Prod.Annou.(R) 1985-2001/Oct 30
(c) 2001 The Gale Group
File 813:PR Newswire 1987-1999/Apr 30
(c) 1999 PR Newswire Association Inc
File 16:Gale Group PROMT(R) 1990-2001/Oct 30
(c) 2001 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
(c) 1999 The Gale Group
File 148:Gale Group Trade & Industry DB 1976-2001/Oct 30
(c)2001 The Gale Group
File 20:World Reporter 1997-2001/Oct 31
(c) 2001 The Dialog Corporation

Set	Items	Description
---	-----	-----

?s software and multi and user and license
Processing
Processed 10 of 23 files ...
Completed processing all files
6097440 SOFTWARE
1617575 MULTI
2242476 USER
897828 LICENSE
S1 17358 SOFTWARE AND MULTI AND USER AND LICENSE
?s s1 and (network or networked)
Processing
Processed 20 of 23 files ...
Completed processing all files
17358 S1
5646910 NETWORK
196135 NETWORKED
S2 11127 S1 AND (NETWORK OR NETWORKED)
?s s2 and (partition or partitioned)
11127 S2

60783 PARTITION
 23836 PARTITIONED
 S3 212 S2 AND (PARTITION OR PARTITIONED)
 ?s s3 and (license (w) manager)
 212 S3
 897828 LICENSE
 4178522 MANAGER
 1043 LICENSE(W)MANAGER
 S4 1 S3 AND (LICENSE (W) MANAGER)
 ?type s4/9/ 1

considered all
JD

4/9/1 (Item 1 from file: 275)
 DIALOG(R) File 275:Gale Group Computer DB(TM)
 (c) 2001 The Gale Group. All rts. reserv.

01767470 SUPPLIER NUMBER: 15973257 (THIS IS THE FULL TEXT)
 Software utilities. (Buyers Guide)
 Microsoft Systems Journal, v10, n1, pS62(5)
 Jan, 1995
 DOCUMENT TYPE: Buyers Guide ISSN: 0889-9932 LANGUAGE: ENGLISH
 RECORD TYPE: FULLTEXT; ABSTRACT
 WORD COUNT: 4534 LINE COUNT: 00388

ABSTRACT: A buyer's guide of 69 **software** utilities covering a range of capabilities is presented. Provided information includes company name, phone number, product name, price and a brief product description. Examples include JP **Software** Inc's \$69 4DOS 5.0, a shell that replaces the DOS command processor and adds power to users' commands. Gazelle Systems Inc's \$79 Back-It for Windows 2.0 is a high-level backup utility that provides automatic, **multi** -volume background backups to or from any DOS device or tape drive. It also provides data compression rates of up to 75%. Executive **Software** Inc's File Alert for Windows NT automatically detects file corruption from power surges, power failures, worn-out hard disks, **software** defects and other sources. The package is priced at \$99 per workstation.

TEXT:

4DOS, version 5.0 JP **Software** , Inc. (617) 646-0904 (800) 368-8777
 4DOS, a replacement for DOS'S command processor, will change the notion that the C>" prompt is slow and frustrating. How? By adding much-needed muscle to your commands, greatly expanding their capabilities and giving you tons of power. Includes commands, functions, and variables. \$69.

allCLEAR for Windows, version 3.0 Clear **Software** (617) 965-6755
 (800) 338-1757

AllCLEAR creates presentation-quality flow charts, decision trees, and fishbone diagrams in graphics mode with drag-and-drop templates or outline mode. Customize any element of your diagram with local and global style sheets. Includes a runtime module and Shape Editor. \$299.95.

AM/ST for Windows, version 3.1 Imagesoft Inc. (800) 245-8840

An application manager for SmallTalk developers. The powerful browser defines a SmallTalk application as coherent set of classes and methods that solve a specific problem. Graphical view of classes, revision histories, profile reports, consistency reports to isolate structural errors, multiple developer environment, and other features. \$499.

ANGOSS KnowledgeSEEKER, version 3.1 Angoss **Software** (416) 593-1122
 ANGOSS KnowledgeSEEKER finds and displays, in both generic rule sets and decisiontrees, multiple groups of cause and effect relationships in data sets. These rules can quickly be used as the basis for the design of expert systems. Pricing based on the # of users.

AUTOMATOR tm| for Windows, version 1.4 Direct Technology Ltd. (212) 475-2747 (800) 486-7565

Personal productivity tool for GUI applications. Automates any Windows application through record/playback facility. A full, flexible, English like scripting language allows development of utility applications to complement and enhance existing **software** . Major features include scheduling, event synchronization, file handling, and dialog creation. \$395.

Back-It for Windows, version 2.0 Gazelle Systems Inc. (801) 377-1288
(800) RUN-FAST

A high-performance backup utility, Back-it for Windows offers automatic, **multi** -volume background backups with data compression rates up to 75%. Allows backups to or from any DOS device or tape drive. Create up to 50 different preset backup configurations that can be scheduled and launched at predetermined times and run unattended. Also backup NetWare Trustee Rights and Bindery Files. \$79.

Backup Exec for Windows NT Server, version 5.0 Arcada Software Inc.
(407) 262-8000 (800) 3-ARCADA

Backup Exec is the first and only full-featured 32-bit backup application created especially for Microsoft Windows NT AS. Backup Exec offers advanced features such as UNC name support, scheduling, disk grooming, email notification, remote registry backup, **multi** -drive concurrent backup, compression and optional autoloader support. \$795.

Backup Exec for Windows NT Server Autoloader, version 5.0 Arcada Software Inc. (407) 262-8000 (800) 3-ARCADA

Backup Exec for Windows NT Server: Autoloader Module provides flexible file-out capabilities for Windows NT LANs. A graphical interface simplifies **user** -defined magazine configuration, using loader slots sequentially for extremely high capacity backup, or grouping the slots for specific operations. \$495.

Backup Exec for Windows NT Workstation, version 5.0 Arcada Software Inc. (407) 262-8000 (800) 3-ARCADA

Backup Exec is the first full-featured 32-bit backup application created especially for Microsoft Windows NT. Microsoft selected Arcada to write the basic backup utility included inside the actual Windows NT product. Backup Exec is an easy-to-use comprehensive data storage solution for Windows NT workstations and servers. \$295.

BOOTCON, version 2.11 Modular Software Systems (206) 631-5781 (800) 438-3930

Resolves configuration problems by allowing you to choose from up to 100 configurations during each boot. Allows multiple Windows configurations and includes a Windows program scheduler. Contains a powerful INI file comparison function. Fully compatible with DOS 3.1-6.X, Windows, Stacker, Double Space, and all memory managers. \$49 ESP.

Boris, version 1.0 StarBase Corp. (714) 442-4466

A **software** agent that automatically backs up, stores, or retrieves any kind of file. Boris notifies a **user** when their disks get dangerously full and can clean up a **user**'s disk by discarding old and unwanted files. Boris will also automatically issue **user** -specified commands at **user** -defined intervals. Price not available yet.

C-DOC Professional, version 6.0 Software Blacksmiths Inc. (905) 858-4466

An automated documentation tool for C and C++ programs. It analyzes unmodified source and produces: functions caller/called hierarchy (ASCII text and Windows graphics); C++ class trees (ASCII and graphics); action-diagrammed listings or reformatted source; local/global/parameter identifier cross-references; complexity and source metrics.

C-Vision, version 3.1 Gimpel Software (610) 584-4261

C-Vision for C is a set of tools to help you analyze, understand and maintain C programs. It includes a cross-referencer that provides highly detailed symbol descriptions including symbol usage and type information, a function call diagrammer, an intelligent source code lister, and a reformatter. \$139.

Cache86 vs. for Windows & DOS, version 5.01 Aldridge Co. (713) 953-1940 (800) 548-5019

Provides complete on-screen control to optimize performance of a system and reports statistics including visual representation of the functioning of the cache. Users can reconfigure, disable, re-enable, and flush to cache from within Windows. Allows Windows to interact with the hard drive at the BIOS level. \$89.95.

CC-RIDER Professional, version 5.0 Western Wares (303) 327-4898

A C/C++ source code analysis, browsing and documentation tool that features push-button tree charts showing class hierarchies, function calls, class nesting, and #include file relationships. Includes database API

library, graphical tree reports, automated function prototype, WinHelp file generation. Links to IDE's and editors for powerful browsing. Supports aU C/C++ compilers. \$279.

Cloaking Developers' Toolkit, version 2.0 Helix Software (718)
392-3100 (800) 451-0551

A developer environment for programmers who want to create TSRs or drivers that run in extended memory. Includes NETRoom (Helix memory manager) Nu-Mega Soft Ice/W, and cloaking driver. \$299.

Code Manager for Windows/Windows NT, version 2.1b Cognitronix (619)
549-8955 (800) 217-0932

Code Manager for Windows manages files by content or any other attribute, even in ZIP (incl. v2.0) compressed files, across multiple disks. Specify text with regular expressions, exact or fuzzy matches. Boolean equations, proximity searching, touch and global replace are supported. \$99.

Collage Complete, version 1.0 Inner Media Inc. (603) 465-3216 (800)
962-2949

Screen capture and bit mapped image handling for Windows and DOS. Capture, crop, edit annotate, convert, and organize screen images of your applications for use in **software** manuals, on-line documentation, training materials, demos, packaging, and sales and marketing literature. \$149.

DocuPACT, version 2.0 Intertech Imaging Corp. (404) 952-8080

Document and image management **software** that is written in Visual C++ and is architected to take advantage of Microsoft's direction and technology, including: OLE 2.0, Windows NT Advanced Serve and SQL Server. It also has APIs for Visual Basic and C/C++. \$895 per client, \$4,995 per server.

ENVISION(R), version 3.4 Future Tech Systems Inc. (206) 939-7552

A **multi -user , multi -media** modeling tool built on a flexible, object-oriented repository. A GUT facilitates adapting ENVISION to address specific modeling needs. Facilities are provided to control most aspects of: diagram graphics, repository attributes, model navigation, rules, calculation macros, reports, and import/export interfaces to other tools. \$8,000, site **license** and volume discounts are available.

ERwin(R)/DBF Logic Works Inc. (609) 252-1177 (800) 78-ERWIN

Using a Windows interface, ERwin/Desktop creates a graphical entity-relationship (ER) model of the database's structure. ER diagrams capture entity, attribute and relationship definitions; primary and foreign keys; referential integrity constraints; business rules; alternate keys and more. Once the ER model is completed, ERwin/Desktop automatically generate DBF and index files. \$495.

Everkey 11, version 2.15 Az-Tech **Software** , Inc. (816) 776-2700 (800)
227-0644

Hardware-based copy control system gives you secure **software** protection. Standard features include: remotely resettable date, execution limits, encryption, compression, **user** data flags, multiple partitions, independent timer and more. Call for a free demo disk. Call for pricing.

Everlock, version 2.14 Az-Tech **Software** , Inc. (816) 776-2700 (800)
227-0644

A **software** -based copy protection system that allows for remotely resettable date and execution limits. Everlock's encryption, anti-debug and anti-diassembly traps ensure your **software** will remain secure. Call for a free demo disk. Call.

File Alert for Windows NT, version 1.0 Executive **Software** (818)
547-2050 (800) 829-4357

A 32-bit application that automatically detects file corruption from sources such as a worn-out hard disk, power surge or failure, **user** error, virus, or **software** defect. File Alert runs with Windows NT on three platforms: Intel-based PCs, Digital's Alpha AXP PC's and MIPS PCs. \$99 per workstation; quantity discounts available.

Fortran Development Tools, version 2.0 Quibus Enterprises Inc. (719)
527-1384

Utilities that aid in development, maintenance, and porting of Fortran. Includes a flexible pretty-printer that indents, renumbers, restructures GOTOs, and improves code readability. Other utilities highlight program structure, extract and repackage subroutines in files, support conditional compilation and include files, and manipulate sequence

numbers. Interactive setup program helps select options. \$149 DOS, \$199 DOS protected mode (also for OS/2, UNIX, & VMS).

Greenleaf MakeForm, version 2.0 Greenleaf Software Inc. (214) 248-2561 (800) 523-9830

Data entry design tool used in conjunction with Greenleaf DataWindows(tm) to reduce source code size and allow you to modify data entry fields and rearrange forms without recompiling or linking. MakeForm creates a resource file that is read by DataWindows at run-time. Features include the ability to define, add, select, copy, move, delete, and insert entry fields including scrollable subforms, tickertape, and memo) and their prompts. Included with Greenleaf DataWindows.

Hamilton C Shell(tm), version 2.2 Hamilton Laboratories (508) 358-5715

Hamilton C shell recreates the original Berkeley UNIX C shell and utilities, adding numerous enhancements. Features history, full-screen command line editing, filename and command completion, procedures, aliases, expressions, command substitutions. Commands include chmod, cp, cron, cut, diff, grep, head, kill, more, mv, printf, rm, sed, tail, tar, touch, tr, uniq, wc. Shipping for Intel, MM, Alpha and PowerPC. \$350 US, \$365 Canada/Mexico, \$395 elsewhere.

Hypersignal for Windows RT-4 Hyperception Inc. (214) 343-8525

RT-4 is an integrated signal-processing environment with broad capabilities in graphical analysis, data acquisition and processing, digital filter design and implementation, realtime instrumentation, DSP Code generation, and algorithm development, verification, and implementation. \$7,995.

ImageMan/32, version 2.0 Data Techniques Inc. (704) 682-4111 (800) 955-8015

ImageMan/32 is a 32-bit toolkit for adding support for raster and vector images formats to your Windows NT and Chicago applications. Supported image format include JPEG, TIFF, TGA, GIF, EPSF, BMP, DIB, IMG, WPG, PCX, DCX, AND WMF. ImageMan/32 provides support for import export conversion, and image-processing features such as rotation, mirroring, color reduction, filters, dithering, brightness and gamma adjustment, scaling, zooming, and palette optimization. \$895.

Infinite Disk tm|, version 2.1 Chili Pepper Software (404) 339-1812 (800) 395-1812

Infinite Disk(tm) automates disk management chores and substantially increases available hard disk space. Files are automatically compressed and/or relocated based on how frequently you use them. Files that have not been used for a specified number of days, for example, are compressed in place (Level 1 Migration). \$129 SRP.

InstallSHEILD, version 2.0 Stirling Technologies (708) 240-9111 (800) 374-4353

Create an installation script in just hours using three ready-to-customize scripts. Incorporate your corporate look and feel with customized fonts and special messages. InstallSHIELD includes over 200 functions, DLL calls, custom dialog boxes, percent complete status bars, externalized strings, and program group/icon creation. \$395 Windows, \$595 Windows NT.

InstallWizard, version 1.1 Jetstream Software Inc. (206) 827-9273 (800) 978-7978

Install Wizard generates commercial-quality install and uninstall programs based on your specifications. Your install program, 100% MFC-based and built around powerful classes for ultra-compression, environment and version checking, etc. (usable in other applications), can produce subdirectories, span multiple diskettes and use shared components. Generated source is easily modified and extended. Requires Visual C++. \$299.

Lexport, version 1.0 Helpful Programs Inc. (205) 880-8782 (800) 448-4154

Allows Visual Basic programs to change national languages during execution. Exports strings from Visual Basic or IN STALIT scripts into files easily used by human or machine translators. Automates internationalization of Visual Basic programs and INSTALIT scripts except for actual translation. Includes a copy of the book Software : Going International. \$129.

Micro Focus Revolve, version 2.0 Micro Focus (415) 856-4161 (800)

This analysis tool for COBOL **software** systems provides users with system-wide data impact analysis and incorporates many other powerful analysis features and utilities. Revolve easily integrates with Micro Focus COBOL Workbench R| to provide an industrial-strength development, testing, and analysis environment. \$1,250.

North Beach Lab DiskDuplicator, version V1.5 North Beach Labs (415) 693-0570 (800) 249-2575

A Windows utility for duplicating and distributing diskettes. Allows for grouping your install disks into a single file and browsing the contents of your disk image files. Allows "Hands-free Copy" and "Auto Countdown" features for faster duplications, automatic file compression and decompression, password protection, and on-line context sensitive help. North Beach DiskDuplicator reads the entire contents of any source diskette, and stores the disk image in memory or in a file on your hard disk. This image can be duplicated as needed, without the original disk. Disk images can be distributed via **network**, modem, email or cdrom. Copies are track for track identical to the original disks. \$59,95.

OmniSort, version 4.11 Omniware (803) 786-7367

Sorts, merges, selects, and formats DOS, Btrieve, and Xbase records. Omnisort can be run standalone or linked with Assembler, Basic, C, Cobol, Fortran, and Pascal Programs. When linked, either complete files or individual records can be passed to the subroutine. OmniSort includes a no-royalty runtime **license** application. \$99.

Pinpoint, version 1.0 Avanti **Software** (415) 329-8999

Pinpoint includes two new tools for developers. Visual Tracer(tm) provides tracing with an indented outline display of function timing statistics to 1 millisecond accuracy with a spreadsheet linked to a horizontal 3D bar graph. Works with Visual Basic and all major C/C++ compilers. \$199.

Pretty Printer for Visual Basic, version 2.0 Aardvaark (201) 833-4355 (800) 4VBASIC

Pretty Printer produces listings of Visual Basic programs that use your choice of fonts, or sizes and styles, and color. These can be set for comments, identifiers, keywords, literals, and page headings. Optionally performs autoindents and connects. The connection lines show the extent of structures such as For/Next Do/loop, If/Else/End If. \$99.99.

Prodea Synergy, version 2.1 Prodea (612) 942-1000

Lets you build custom applications from shrink- wrapped **software** without programming and enables the automation of processes. It supports more than 75 Windows and DOS applications including communications and database query products. It includes a built-in scheduler and many features for advanced process automation. \$295: Prodea Synergy for Microsoft Office, \$99.

Q87 Math Coprocessor Emulator, version 3.7 Quickware (512) 280-1452 (800) 392-9349

Q87 is a high performance math coprocessor emulator that is compatible with DOS and Windows 3.X programs that otherwise require a math coprocessor. \$35.

Quick Release, version 3.0 Helpful Programs Inc. (205) 880-8782 (800) 448-4154

Non-scripted installation system for Microsoft Windows program manager groups, multiple icons, WIN.INI, BUFFERS, FILES, SHARE.EXE, more. Changeable colors, automatic version checking, reads VB make files package VBXs and DLLs. Integral compression and master diskette builder. "Self-extracting" option. \$99.

R&R Report Writer, SQL Edition for Windows, version 6 Concentric Data Systems (508) 366-1122 (800) 325-9035

Design snaking column, crosstab, Avery label, or free-form reports. Print results or export to DBF, WKS, or text files. Open architecture allows you to customize report templates, wizards, dictionaries, pre-defined calculations, **user**-defined functions, and runtime report parameters. Includes royalty-free runtime with EXE, DLL, and VBX interfaces. \$395.

S.I.P.-Uninstall, version 1.5 S.I.P.-**Software** Solutions (+49) 951-43489

Watches over Autoexec.Bat, Config. Sys., Win.Ini, System. Ini or any

other text or Ini files. Offers all changes made any DOS or Windows installation. Gives a detailed protocol of all changes. Up to 100% deinstallation possible. All monitoring and deinstallation options under full **user** control Demo available. \$79.

SegMentor, version 2.5 MicroQuill Inc. (206) 525-8218

SegMentor tm| optimizes allocation of functions to code pages/segments so that disk swapping is minimized. Applications require less memory and performance improves 2-10X in tight memory conditions. Segmentor traces runtime functions calling activity, then computes an optimal solution that groups those functions calling each other most often into the same page/segment.

Storage or Windows NT Server, version 5.0 Arcada **Software** Inc. (407) 262-8000 (800) 3-ARCADA

Storage Exec the first enterprise-wide backup solution for Windows NT Server networks - provides powerful data management tools to configure, schedule, monitor and control local and remote data storage from a central location. Scalable to accommodate small, medium or large networks. Storage Exec optimizes hardware investment reduces **network** traffic, and ensures consistent execution of data storage activities. \$2,385.

Take Command, version 1.0 JP **Software** , Inc. (617) 646-0904 (800) 368-8777

A Windows implementation of JP **Software** 's award-winning command processor technology. The graphical interface has dozens of features feasible only in a graphical environment such as Windows-menus, dialogs, application control and cut and paste support. \$59.

TE Developer Kit, version 4.0 Sub Systems Inc. (508) 352-9020 (800) 447-6819

Allows you to incorporate text editing features into your application. The character formatting features include bold, underline, italic, superscript, subscript color, and multiple fonts/point sizes. The paragraph formatting features including centering, justification, indention and double spacing. Also supports embedded pictures, cut/paste, search/replace, pagination, tables, columns, OLE, and printing functions. No royalties. \$389.

Team/V(R) for Win32, version 2.0 Digitalk (714) 513-3000 (800) 922-8255

Organizes the work of a team of Smalltalk/V developers by providing a programming environment through which programming teams can structure and coordinate their work. Team/V(R) organizes code into modular units called packages. Contains a set of tools for defining, browsing, and storing packages. \$2,495.

The Elan **License Manager** , version 3.0 Elan Computer Group (415) 964-2200

A **software** licensing toolkit for applications developers that controls **multi user** access to **software** applications in a **network** or **multi user** environment. It is incorporated into a **software** application and shipped as part of that application to the end **user** . It also includes the ability to create fully-functional, yet protected evaluation copies and die ability to **license** individual features.

Thompson Toolkit, version 3.1A Thompson Automation **Software** (503) 224-1639 (800) 944-0139

The Toolkit provides over 100 programmers tools designed to provide superior UNIX capabilities without sacrificing ability to run DOS/OS2 commands. Includes commands: shell, diff, ls, grep, sed, sort, find, etc. Both UNIX and Korn shell compatible with a more DOS-friendly script syntax. Pop-up window display of previous command history. Shell uses 3K bytes when running other commands. Supports EMS/XMS memory. \$99.

Time After Time, version 1.15 Aldia Systems Inc. (602) 866-1786 (800) 999-5735

Schedule lengthy system builds with Windows event scheduler. Schedule Windows and DOS programs to execute at specific times. Create recurring schedules using intuitive, graphical interface. Schedules can be simple or complex combinations of days, dates, and times. Time after Time supports macro recorders, Windows calender, and notifies **user** of missed events. \$79.95 USD.

Turbo REXX Toolkit, version 1.1 Pelt Industries (303) 442-7700 (800) 741-4322

The Toolkit includes a class browser for OOREXX a source editor with Code-a-chrome tm| technology, a project MAKE utility, a source delta generator, a source UPDATE, an assembler and linker, a RCS-Revision Control System, an object code Librarian, and an Object Module Dump utility. Call for pricing.

VB Escort, version 2.0 Full Sail Software (817) 292-4463 (800) 879-2983

A tool for working in Visual Basic. VB Escort has a multiple-item clipboard function for copying code along with View and Print Clipboard functions. It has a **user** -defineable Code Library where you can save subroutines and short pieces of code for immediate access in future projects. Allows back up of all of a project's files, including VBX files. Many other features. \$19.95.

VBXRef, version 2.0 Microhelp Inc. (404) 516-1099 (800) 922-3383

VBXRef creates detailed cross-reference reports of any Visual Basic project. Reports can be created that show the names of all VB Keywords, constants, functions, procedures, static variables, arrays, numeric and string literals, and control properties with the number of times each is referenced in the project as well as the module name, procedure and line number when they are used. VBXRef also allows you to copy, move or delete modules, DLLs and individual procedures between projects. \$99.

VEXE for Windows 3.1, version 1.0 Versatile Control Systems (407) 881-9050

Merge any of the VBX, EXE or DLL files used by your application into a single "Virtual Executable" file. This VEXE file runs just like the original program but uses the embedded copies instead. Requires no change in code. \$99.95.

Visual Companion, version 1.0 Object F/X (612) 644-6064

Allows developers in any language to add geographic visualization and analysis to new or existing applications. It offers capabilities such as: Interactive map, table, and image views. Provides sophisticated spatial analysis such as proximity searches, thematic mapping and others. \$1,000, volume discounts available.

Visual imaging System, version 1.0 Helpful Programs Inc. (205) 880-8782 (800) 448-4154

General purpose, project-oriented diskette duplication **software** for formatting, copying, serialization, and verification of all popular PC diskette formats by unskilled operators. Stores images for future duplication. Allows unattended duplication multiple master disks or images. \$129 US.

Visual Release Crypto Pack, version 6.0 Helpful Programs Inc. (205) 880-8782 (800) 448-4154

Allows encrypted file and product distribution including locked CD-ROM, diskette, or e-mail distribution. Supports permanent key and "ever changing" key modes. Ever changing key allows superdistribution (uncontrolled distribution) of product because the same access key never works twice, even from CD-ROM. Use RC4 and public/private key cryptography. Requires Visual Release. \$149 US.

Visual Release for Windows NT Pack, version 6.0 Helpful Programs Inc. (205) 880-8782 (800) 448-4154

Extends Visual Release to include native Windows NT installers for x86 and PowerPC platforms (call for others). Includes NT-specific registry functions. Requires Visual Release. \$149 US.

Visual Release Translation Pack, version 6.0 Helpful Programs Inc. (205) 880-8782 (800) 448-4154

Ready-to-use translations for fourteen languages for all installers in Visual Release. Includes a copy of Lexport. Languages included are Conventional Chinese, Danish, Dutch, English, Finnish, French, French Canadian, German, Italian, Japanese, Norwegian, Portuguese, Spanish and Swedish. Requires Visual Release. \$249 US.

Visual Release Version Link Pack, version 1.0 Helpful Programs Inc. (205) 880-8782 (800) 448-4154

Interfaces Visual Release directly to version control and storage products including SourceSafe and PVCS. Allows direct incorporation of products under version control into product release builds. Requires Visual Release. \$99.

Visual Release with instalit, version 6.0 Helpful Programs Inc. (205)

880-8782 (800) 448-4154

Release toolset with royalty free installers. Drag and drop file selection, compression, patching, script writer, diskette duplication, serialization, dialogue editor, translation, more. Install, uninstall and preview modes, gauges, simple cryptography, binary and text editing. Windows installers handle version control, files in use, registry, icons, toolbars, DDE, help, DLLs, more. \$299.

WindowBuilder Pro for IBM Smalltalk, version 1.0 Objectshare Systems Inc. (408) 970-7280

An interactive tool for building graphical **user** interfaces in IBM Smalltalk. Developers can incrementally create an interface and view the precise effects of each of the revisions. Includes full source code. No run-time fees. \$695-\$795.

WinSleuth Gold Plus, version 2.0 E Ware (714) 236-1380

WinSleuth's analysis and diagnostic capabilities include configuration information and testing for the major system components. Also included are a customizable Memory test Environment Analysis, extensive **software** setup information and detailed reports. NEW in v2.0: "ConFlict Finder" - the first of its kind for finding conflicts with multimedia and other expansion devices. \$99.95.

WINSTALL, version 4.0 Knowledge Dynamics Corp. (210) 979-9424 (800) 331-2783

An installation toolkit for Windows. Features include: able to execute Windows, full Windows GUI interface, add a group to the Program Manager or an icon to a group, can modify any INI-format file. Windows NT compatible. Comes with full C source. New Cloak Option encrypts script files. \$399.95.

WINSTALL **Multi** -platform Pack, version 4.0 Knowledge Dynamics Corp. (210) 979-9424 (800) 331-2783

An installation toolkit that runs under Windows NT, DOS, or OS/2 application with a Windows GUI interface. Adds a group to the Program Manager or an icon to a group. Can modify any INI-format file. Allows customized DLL creation without C programming. Features a distribution disk builder, full C source, and the new Cloak Option, which encrypts script files. \$499.95.

Wizard of O.S., version 1.0 Modular **Software** Systems (206) 631-5781 (800) 438-3930

Choose the desired operating system from menu during each boot. WOS allows multiple DOS versions to be installed on a single primary **partition**, and allows booting from other disk partitions which may contain different operating systems such as Windows 95, OS/2, Windows NT, and UNIX. No special disk partitions required. \$59 ESP.

WRAP, version 1.5 Knowledge Garden Inc. (516) 862-0600

This utility gives Windows developers on-the-fly file compression and decompression from KPWin, Visual Basic, Visual C++, or any other Windows development tool that supports DLLs. WRAP includes a visual front-end written in Knowledge Garden's KPWin++ development tool. WRAP is useful for creating installation routines, help systems, and compressed hypertext documents. \$129.

XRef for Visual Basic, version 1.09 Crescent **Software** Inc. (203) 438-5300 (800) 35-BASIC

Sophisticated cross-reference utility to document an entire application written in Visual Basic. XREF lists all keywords, forms, controls, properties, events, methods, variables, arrays, constants, and procedures alphabetically, by type and scope, as well as across separate modules. \$99.

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COMPANY NAMES: JP **Software** Inc.--Products--Purchasing; Gazelle Systems Inc.--Products--Purchasing; Executive **Software** Inc.--Products--Purchasing

DESCRIPTORS: Product Description Specification; Directory; **Software** Selection; Backup **Software**; OS Command Shell; Systems Data Security **Software**

SIC CODES: 7372 Prepackaged software

TRADE NAMES: 4DOS 5.0 (OS command shell); Back-It for Windows 2.0 (Backup **software**); File Alert for Windows NT (Systems data security **software**)

OPERATING PLATFORM: Microsoft Windows
FILE SEGMENT: CD File 275

?s s1 and (partition or partitioned)

17358 S1

60783 PARTITION

23836 PARTITIONED

S5 282 S1 AND (PARTITION OR PARTITIONED)

?s s5 and concurrent

282 S5

176835 CONCURRENT

S6 59 S5 AND CONCURRENT

?type s6/3,ab/all

>>>No matching display code(s) found in file(s): 65, 593, 623-624, 810, 813

6/3,AB/1 (Item 1 from file: 15)

DIALOG(R)File 15:ABI/Inform(R)

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01832009 04-83000

Managing product development projects: On the significance of fountains and deadlines

Lindkvist, Lars; Soderlund, Jonas; Tell, Fredrik

Organization Studies v19n6 PP: 931-951 1998 ISSN: 0170-8406

JRNL CODE: ORS

WORD COUNT: 9700

ABSTRACT: Product development in high-technology industries is often carried out in projects. Managing such projects is a matter of both promoting creative knowledge generation processes and controlling progress towards global goals and time limits. From such a dual perspective, the meaning and suitability of organizing product development projects in a **concurrent** rather than a sequential fashion and the use of deadlines as control mechanisms are discussed. The empirical case is about the breakthrough in Japan for the Swedish company Ericsson. This project forced management to reconsider their traditional way of working with projects and to try a new one instead - labelled the fountain model - which relied more on **concurrent** work and inter-functional cooperation.

6/3,AB/2 (Item 2 from file: 15)

DIALOG(R)File 15:ABI/Inform(R)

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01739543 03-90533

Schematic, layout and autorouters

Sullivan, Kimberlee

Printed Circuit Design v15n12 PP: 11-20 Dec 1998 ISSN: 1047-5567

JRNL CODE: PCC

WORD COUNT: 4659

ABSTRACT: One thing that can be said about the printed circuit board EDA market is that it is much like that old saying about the weather - wait a few minutes and it will change. Over the last few months, industry watchers have seen PADS acquire Advanced CAM Technologies, OrCAD merge with Summit Design, Intercept acquire the PCB portion of Xynetix, and Cadence announce a schematic, layout and router package for under \$10,000. A round up of basic information from PCB EDA companies about their schematic and layout tools is presented.

6/3,AB/3 (Item 3 from file: 15)

DIALOG(R)File 15:ABI/Inform(R)

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01342240 99-91636

A real change of face

Gaskin, James E

Informationweek n604 PP: 50-56 Nov 4, 1996 ISSN: 8750-6874 JRNL CODE:
IWK

WORD COUNT: 1239

ABSTRACT: What is really significant about Novell Inc.'s IntranetWare (NetWare 4.11) is a major step forward in the management of network servers and users. Much of the server configuration is still under the creaky C-Worthy interface, complete with ASCII graphics and strong primary colors, but **user** and server management has gone graphical. Novell addresses its users' phobias about NetWare Directory Services (NDS) by replacing some C-Worthy NDS management tools with the NDS Manager - a 32-bit graphical management application - and by adding more systems management feature within NetWare Administrator.

6/3,AB/4 (Item 4 from file: 15)

DIALOG(R)File 15:ABI/Inform(R)

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00783471 94-32863

NetWare Loadable Modules for CD-ROM networking

Starr, Karen J

CD-ROM Professional v6n6 PP: 82-87 Nov 1993 ISSN: 1049-0833

JRNL CODE: LDP

WORD COUNT: 2791

ABSTRACT: NetWare Loadable Modules (NLM) provide access to CD-ROMs on a network using Novell's NetWare operating system. The appropriate choice of a CD-ROM networking product will reflect the needs of an organization. Benefits of NLM products include: 1. extensive monitoring options for the system administrator to track usage and performance, 2. ability to access several CD-ROM applications using one drive letter, 3. menuing program provides easy access to DOS- and Windows-based CD-ROM applications, 4. ability to map CD-ROMs without drivers, and 5. ability to add CD-ROM services to an existing file server. Some of the concerns raised about NLM products include: 1. Excessive use of Novell NLMs tends to overflow and centralize the Novell server. 2. Server lockups and crashes have been reported on the CDROMLAN forum available on the Internet. 3. NetWare programs must be used to do simple CD-ROM maintenance. 4. The monitoring **software** from the server with limited monitoring available from workstations must be used. 5. **User** level security can be limited.

6/3,AB/5 (Item 1 from file: 9)

DIALOG(R)File 9:Business & Industry(R)

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01647787

A Real Change Of Face

(Novell's NetWare 4.11 has new name, IntranetWare, because it now supports Internet; software is major step in management of network servers and users)

Information Week, p 50

November 04, 1996

DOCUMENT TYPE: Journal ISSN: 8750-6874 (United States)

LANGUAGE: English RECORD TYPE: Fulltext

WORD COUNT: 1226

ABSTRACT:

Novell changed the name of its NetWare 4.11 to IntranetWare because it now includes Internet support. The **software** is also a major step forward in the management of network servers and users. Novell addressed some users' fears about NetWare Directory Services (NDS) by replacing some C-Worthy NDS

management tools with the NDS Manager and by adding more systems management features with NetWare Administrator. A new program included in the **software** is NDS Manager, which combines the old **Partition Manager** command-line utility with portions of the server console utility Dsrepair. The article also discusses how to use various NDS functions.

6/3,AB/6 (Item 1 from file: 810)
DIALOG(R)File 810:Business Wire
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0711259 BW1222

SILVERSTREAM: SilverStream's next-generation Web application platform enables easy development and deployment of pure Java applications

June 09, 1997

Byline: Business/Technology Editors

6/3,AB/7 (Item 1 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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02260613 SUPPLIER NUMBER: 53578800 (USE FORMAT 7 OR 9 FOR FULL TEXT)
OF INTEREST. (Product Announcement)
Kim, Eugene Eric
Dr. Dobb's Journal, 24, 2, 142(1)
Feb, 1999
DOCUMENT TYPE: Product Announcement ISSN: 1044-789X LANGUAGE:
English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1730 LINE COUNT: 00163

ABSTRACT: A variety of new programming applications are reaching the market. MicroEdge is introducing Visual SlickEdit 4.0, a multiplatform editor fo Unix, OS/2 and OS/390. Be Inc is shipping BeOS 4.0 and operating system for creating digital content. Green Hills **Software** 's CodeBalance is an optimizing profiler for the company's compilers. Riverace's ACE Version 4.0 is a portable C++ class library for the development of **concurrent** applications. GoAhead **Software** is distributing the source code for its Fusion embedded Web server.

6/3,AB/8 (Item 2 from file: 275)
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02073877 SUPPLIER NUMBER: 19310944 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Java development tool. (Aptivity Developer) (Brief Article) (Product Announcement)
Databased Web Advisor, v15, n4, p18(1)
April, 1997
DOCUMENT TYPE: Brief Article Product Announcement ISSN: 1090-6436
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 103 LINE COUNT: 00012

6/3,AB/9 (Item 3 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01838424 SUPPLIER NUMBER: 17437281 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Data warehousing conference. (sponsored by Digital Consulting and the META Group)
Computer Conference Analysis Newsletter, n363, p1(1)
May 18, 1995

ISSN: 1071-2216
WORD COUNT: 5505

LANGUAGE: English
LINE COUNT: 00489

RECORD TYPE: Fulltext

6/3,AB/10 (Item 4 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)
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01804827 SUPPLIER NUMBER: 17155740 (USE FORMAT 7 OR 9 FOR FULL TEXT)

**Tools and utilities. (1995 Database Buyer's Guide and client/server
sourcebook) (Buyers Guide)**

DBMS, v8, n6, p72(29)

May 15, 1995

DOCUMENT TYPE: Buyers Guide

ISSN: 1041-5173

LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 45154 LINE COUNT: 03869

ABSTRACT: A buyers guide offers information on development tools and utility applications. The tools are employed in every aspect of application development, from prototyping to querying and reporting. The guide is organized alphabetically according to category. The categories include 3GL tools, analysis, documentation and testing tools, application generators and screen painters, CASE, database design and modeling tools, data conversion and transfer applications, DBA and systems administration tools, disk/file utilities, engine/file management subsystems, graphics applications, help systems, class libraries, printing and publishing tools, query tools, report writers and a variety of utilities. The guide includes vendor information and a brief description of each product. The listings were developed through a reader survey requesting detailed product descriptions, platform information and prices. Some prices are not provided because they vary according to operating systems used, hardware platforms, upgrade considerations, site licensing agreements and promotional discounts.

6/3,AB/11 (Item 5 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)
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01804821 SUPPLIER NUMBER: 17155728 (USE FORMAT 7 OR 9 FOR FULL TEXT)

**Client/server and host app. development tools. (1995 Database Buyer's Guide
and Client/Server Sourcebook) (Buyers Guide)**

DBMS, v8, n6, p20(13)

May 15, 1995

DOCUMENT TYPE: Buyers Guide

ISSN: 1041-5173

LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 20277 LINE COUNT: 01789

ABSTRACT: A buyers guide offers information on client/server and host development applications. These programs are used to develop and deploy host-based or client/server applications. Many of the tools have integrated DBMS components. Users and developers are able to customize these applications to meet the needs of their organizations. The guide includes vendor information and a brief description of each product. Organization is alphabetical according to category. The listings were developed through a reader survey requesting detailed product descriptions, platform information and prices. Some prices are not provided because they vary according to operating systems used, hardware platforms, upgrade considerations, site licensing agreements and promotional discounts.

6/3,AB/12 (Item 6 from file: 275)

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01767470 SUPPLIER NUMBER: 15973257

(USE FORMAT 7 OR 9 FOR FULL TEXT)

Software utilities. (Buyers Guide)

Microsoft Systems Journal, v10, n1, pS62(5)
Jan, 1995

DOCUMENT TYPE: Buyers Guide ISSN: 0889-9932 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4534 LINE COUNT: 00388

ABSTRACT: A buyer's guide of 69 **software** utilities covering a range of capabilities is presented. Provided information includes company name, phone number, product name, price and a brief product description. Examples include JP **Software** Inc's \$69 4DOS 5.0, a shell that replaces the DOS command processor and adds power to users' commands. Gazelle Systems Inc's \$79 Back-It for Windows 2.0 is a high-level backup utility that provides automatic, **multi** -volume background backups to or from any DOS device or tape drive. It also provides data compression rates of up to 75%. Executive **Software** Inc's File Alert for Windows NT automatically detects file corruption from power surges, power failures, worn-out hard disks, **software** defects and other sources. The package is priced at \$99 per workstation.

6/3,AB/13 (Item 7 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01688542 SUPPLIER NUMBER: 15356022 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Middleware and connectivity tools. (1994 Database Buyer's Guide and Client/Server Sourcebook) (Buyers Guide)
DBMS, v7, n6, p51(5)
June 15, 1994
DOCUMENT TYPE: Buyers Guide ISSN: 1041-5173 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 7598 LINE COUNT: 00649

ABSTRACT: A listing of connectivity and middleware tools for DBMS products is presented. These **software** products range from XTech Inc's Biton communications interface between Oracle and FoxPro applications to Trinzic Corp's InfoHub data-access tool. Also included are such innovations as Oracle Corp's Oracle Glue, which integrates various development tools to provide access to services for multiplatform clients, and Transarc Corp's Encina online transaction processing (OLTP) development and administration tool.

6/3,AB/14 (Item 8 from file: 275)
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01678501 SUPPLIER NUMBER: 15102627 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Select* from RDBMS. (competition increasing in relational database management systems market) (Special Report: DB/Expo 94)
Menninger, Dave
Data Based Advisor, v12, n4, p76(7)
April, 1994
ISSN: 0740-5200 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4082 LINE COUNT: 00329

ABSTRACT: Competition is increasing in the relational database management system (RDBMS) market, making it difficult to choose among the various available products. Most of the products offer similar features, making the way these features are implemented an important selection criteria. The key features include triggers, or collections of Structured Query Language (SQL) statements that are invoked by database events; stored procedures, or SQL statements that are compiled, optimized and stored on the server; SQL standards and extensions; cursor support; transaction management; concurrency; optimization; distributed processing; **multi** -processor support; indexes; bulk data transfer; **user** -defined functions; platforms supported; and price. The features of Open Ingres, InterBase 3.3, SQLBase

5.2, Database Manager 2 for OS/2 1.0, Oracle 7.1 and SQL Server are compared.

6/3,AB/15 (Item 9 from file: 275)
DIALOG(R) File 275:Gale Group Computer DB(TM)
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01635820 SUPPLIER NUMBER: 13744569 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Server takes 4D to new dimensions: database solution pairs ease, efficiency. (ACI US Inc.'s 4D Server database server) (includes related article on 2D Labs' test methodology and Benchmarks) (Software Review) (Evaluation)
Male, Mel
MacWEEK, v7, n16, p47(3)
April 19, 1993
DOCUMENT TYPE: Evaluation ISSN: 0892-8118 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 2052 LINE COUNT: 00165

ABSTRACT: ACI US Inc's \$895-for-single-user 4D Server 1.01 data base management system (DBMS) server is a powerful and useful program. The **software** is designed for use with the 4th Dimension (4D) 3.0, one of the most popular relational DBMSs. **Software** was tested for installation, maintenance and performance, and the manufacturer's claims were shown to be accurate. The package is complete, containing **software** for the clients as well as the server, plus database programming **software** included in 4D 3.0. ACI claims that only 1.5Mbytes of RAM are necessary, but users will need significantly more RAM for the program to run properly. The DBMS uses time-sliced multitasking, which lets users operate several database functions at once. The interface is clear and simple to use, consisting of a Process window plus File, Process and Backup pull-down menus. Installation is easy.

6/3,AB/16 (Item 10 from file: 275)
DIALOG(R) File 275:Gale Group Computer DB(TM)
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01609553 SUPPLIER NUMBER: 14049031 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Network operating systems: sizing up the competition. (Software Review) (comparison of network operating system products from Novell Inc., Banyan Systems, Microsoft Corp. and DEC) (includes directory of companies and related articles on Novell's NetWare, Banyan's Virtual Network Solution, third-party integration and DEC's Pathworks) (Evaluation)
Gandhi, Nick
DEC Professional, v12, n7, p18(7)
July, 1993
DOCUMENT TYPE: Evaluation ISSN: 0744-9216 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4012 LINE COUNT: 00328

ABSTRACT: Network operating systems are compared to offer insight into their differences. Novell Inc's NetWare provides competent DOS, Macintosh, NFS and FTAM migration, and a variety of network applications as well as many third-party applications are available. NetWare offers only IPX print and file services, and wide-area-network support is limited, however. Banyan Systems' Virtual Network Solution (VINES) offers good wide-area-network support and performance, and its integration of OS/2, DOS, Macintosh and Microsoft Windows is competent. VINES offers only SPP print and file services, and there is no NetWare or LAN Manager client support, however. DEC's Pathworks offers local- and wide-area-network support and LAN Manager, Macintosh and NetWare integration and management, but performance and third-party vendor support is limited. Microsoft's LAN Manager is OS/2 based, but it will become available as part of Microsoft's Microsoft Windows NT and Windows NT Advanced Server. LAN Manager provides file and print services to NT and enables LAN access or WAN access with

TCP/IP.

6/3,AB/17 (Item 11 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01538302 SUPPLIER NUMBER: 12732567 (USE FORMAT 7 OR 9 FOR FULL TEXT)
**LAN Manager in a multi-vendor world. (Software Review) (LAN Manager 2.1
from Microsoft Corp. and LAN Manager/X 1.3 from Hewlett-Packard) (local
area network) (Evaluation)**
Culberson, Chris M.
LAN Technology, v8, n10, p95(6)
Oct, 1992
DOCUMENT TYPE: Evaluation ISSN: 1042-4695 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 5045 LINE COUNT: 00390

ABSTRACT: LAN Manager 2.1, from Microsoft Corp, is a combination of the best reseller versions and features several updated features such as native TCP/IP and server-workstation auto tuning. LAN Manager 2.1 is priced at \$1,995 for up to 10 users; an unlimited license is \$5,495; the per workstation price of LAN Manager TCP/IP Utilities is \$195. System requirements when used on a file server include an 80286 processor or greater, OS/2 1.21 or 1.3, 9Mbytes RAM, and 6Mbytes hard disk space. LAN Manager/X 1.3, from Hewlett-Packard, is the best implementation of LAN Manager for Unix. Its price is \$2,200 for eight users. The network operating system allows HP UNIX-based workstations to act as LAN Manager servers to MS-DOS, MS Windows or OS/2-based clients. LAN Manager/X 1.3 runs under HP-UX 7.x and 8.x on the HP 300 through 800 series workstations and servers.

6/3,AB/18 (Item 12 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

01450158 SUPPLIER NUMBER: 11074469 (USE FORMAT 7 OR 9 FOR FULL TEXT)
**Network management: products to configure, control, monitor, test, protect,
and inventory your enterprise network's resources. (a correction to this
article appears in the January 1992 issue, page 151) (Buyers Guide)**
LAN Magazine, v6, n8, p146(28)
August, 1991
DOCUMENT TYPE: Buyers Guide ISSN: 0898-0012 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 17867 LINE COUNT: 01493

ABSTRACT: A wide variety of **software** and hardware tools are available for managing enterprise-wide networks. A network administrator's responsibilities include keeping the network functioning smoothly, anticipating and planning for problems and future growth and doing this all efficiently. The Simple Network Management Protocol (SNMP) gained much more in support in 1991 and is now the most widely supported network management protocol. SNMP enables hardware to communicate network management data to a SNMP management station where the network administrator can analyze and act on the data to configure and manage the network. SNMP devices are available that can monitor and report on every component and function of a network and the attached hardware. Many network management tools are briefly noted in the following categories: cable-testing equipment, help desk **software**, inventory **software**, network design **software**, network management **software**, network management hardware, protocol analyzers, security, server management **software**, support and training services, tape backup hardware and tape backup **software**.

6/3,AB/19 (Item 13 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)

(c) 2001 The Gale Group. All rts. reserv.

01444854 SUPPLIER NUMBER: 11142851 (USE FORMAT 7 OR 9 FOR FULL TEXT)
X Windows terminals designers search for a single-processor solution.
Wilson, Dave
Computer Design, v30, n11, p77(6)
August, 1991
ISSN: 0010-4566 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4134 LINE COUNT: 00320

ABSTRACT: X Windows terminals promise workstation graphics at terminal prices, but the devices require a local microprocessor, LAN controllers, memory controllers and video digital-to-analog converters. X Windows terminals currently cost between \$1,500 and \$5,000, but volume production is not expected until unit prices fall below \$1,000. The devices look alike on the outside, but they use very different designs. The decision as to which devices become the choice of X Windows terminal designers may be based more on company politics than on how effectively the hardware architectures can be optimized to run X Windows **software**. X Windows terminals are comprised of a CPU, a graphics processor subsystem, a network controller, nonvolatile memory and a peripheral controller. X Windows terminals are described from Hewlett-Packard Co, Samsung, Network Computing Devices, Tektronix and Northwest Digital Systems.

6/3,AB/20 (Item 14 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01379288 SUPPLIER NUMBER: 09580333 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Title fight. (Software Review) (Novell's NetWare 386 3.1 and Microsoft's LAN Manager 2.0 local area network; includes related article on problems in installing a network) (evaluation)
Moss, David
PC User, n143, p52(7)
Oct 10, 1990
DOCUMENT TYPE: evaluation ISSN: 0263-5720 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 5468 LINE COUNT: 00418

ABSTRACT: A review and comparison of Microsoft Corp's LAN Manager 2.0 and Novell Inc's NetWare 386 3.1 network operating systems extols both products but favors LAN Manager 2.0 because of its far lower price. Novell has the dominant position in a market that will grow from the current 20 percent of all microcomputers networked to 50 percent networked by 1995. Microsoft, though, is rapidly increasing its dealer and **user** base. LAN Manager 2.0 (795 pounds sterling for five users) is rated excellent for installation, ease of use, ease of network administration and functionality. The **software** provides both file server and client-server networking support; UNIX and VAX VMS versions are available. NetWare 386 3.1 (5,995 pounds sterling for up to 250 users) is rated excellent for ease of network administration and functionality. Other versions support VMS and Macintosh environments.

6/3,AB/21 (Item 15 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

01301295 SUPPLIER NUMBER: 07424540 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Minifinders. (capsule guide to software packages for the Macintosh) (buyers guide)
MacUser, v5, n8, p219(14)
August, 1989
DOCUMENT TYPE: buyers guide ISSN: 0884-0997 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT
WORD COUNT: 21395 LINE COUNT: 01731

6/3,AB/22 (Item 16 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

01288701 SUPPLIER NUMBER: 07088168 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Minifinders.
MacUser, v5, n4, p245(14)
April, 1989
ISSN: 0884-0997 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 22699 LINE COUNT: 01842

6/3,AB/23 (Item 1 from file: 624)
DIALOG(R)File 624:McGraw-Hill Publications
(c) 2001 McGraw-Hill Co. Inc. All rts. reserv.

0433816
New Opportunities for High-Availability Systems
Unix World November, 1992; Pg 41; Vol. IX, Number 11
Journal Code: UNIX ISSN: 0739-5922
Section Heading: The Serlin Report
Word Count: 1,418 *Full text available in Formats 5, 7 and 9*

BYLINE:
Omri Serlin

6/3,AB/24 (Item 1 from file: 636)
DIALOG(R)File 636:Gale Group Newsletter DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

03878798 Supplier Number: 48475337
PROGRESS SOFTWARE: Progress Software Corporation ships Apptivity 2.1
M2 Presswire, pN/A
May 11, 1998
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 737

6/3,AB/25 (Item 2 from file: 636)
DIALOG(R)File 636:Gale Group Newsletter DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

03731186 Supplier Number: 48066174
PROGRESS SOFTWARE: Progress releases Java development tools for enterprise -- Apptivity 2.0
M2 Presswire, pN/A
Oct 21, 1997
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1657

6/3,AB/26 (Item 3 from file: 636)
DIALOG(R)File 636:Gale Group Newsletter DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

02943375 Supplier Number: 45987741
STAC: Stac replica software makes traditional backup obsolete
M2 Presswire, pN/A
Dec 5, 1995
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1325

6/3,AB/27 (Item 4 from file: 636)
DIALOG(R)File 636:Gale Group Newsletter DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

02882125 Supplier Number: 45850245
STAC: New server replication product more reliable, faster and lower cost than standard backup offerings
M2 Presswire, pN/A
Oct 10, 1995
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1328

6/3,AB/28 (Item 1 from file: 621)
DIALOG(R)File 621:Gale Group New Prod.Annou.(R)
(c) 2001 The Gale Group. All rts. reserv.

01662726 Supplier Number: 50067755
NetDynamics 4.1 Delivers Superior Application Server Integration And Scalability; Enhanced Development Features
PR Newswire, p609SFTU044
June 9, 1998
Language: English Record Type: Fulltext
Article Type: Article
Document Type: Newswire; Trade
Word Count: 732

6/3,AB/29 (Item 2 from file: 621)
DIALOG(R)File 621:Gale Group New Prod.Annou.(R)
(c) 2001 The Gale Group. All rts. reserv.

01525781 Supplier Number: 47335570
Apptivity Ships First Java Development Tool for Creating Thin Client, Multi-Tiered, Database Applications
PR Newswire, p0428SFM106
April 28, 1997
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1536

6/3,AB/30 (Item 3 from file: 621)
DIALOG(R)File 621:Gale Group New Prod.Annou.(R)
(c) 2001 The Gale Group. All rts. reserv.

01483845 Supplier Number: 47092541
Apptivity Introduces First Java Development Tool for Creating Scalable, Multi-Tiered, Database Applications.
Business Wire, p02031200
Feb 3, 1997
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1413

6/3,AB/31 (Item 4 from file: 621)
DIALOG(R)File 621:Gale Group New Prod.Annou.(R)
(c) 2001 The Gale Group. All rts. reserv.

01207795 Supplier Number: 43502394
ACI SHIPS 4D SERVER
News Release, p1
Dec 4, 1992

Language: English Record Type: Fulltext
Document Type: Magazine/Journal; Trade
Word Count: 853

6/3,AB/32 (Item 5 from file: 621)
DIALOG(R)File 621:Gale Group New Prod.Annou.(R)
(c) 2001 The Gale Group. All rts. reserv.

01013862 Supplier Number: 39625173
ADR's PC/PTE BRINGS MAINFRAME PROGRAM DEVELOPMENT CAPABILITIES TO IBM PC
PR Newswire, pN/A
Nov 4, 1985
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 362

6/3,AB/33 (Item 1 from file: 813)
DIALOG(R)File 813:PR Newswire
(c) 1999 PR Newswire Association Inc. All rts. reserv.

0868304 LA001B
STAC REPLICA SOFTWARE MAKES TRADITIONAL BACKUP OBSOLETE
DATE: October 9, 1995 08:31 EDT WORD COUNT: 1,301

6/3,AB/34 (Item 2 from file: 813)
DIALOG(R)File 813:PR Newswire
(c) 1999 PR Newswire Association Inc. All rts. reserv.

0867877 LA017
STAC REPLICA SOFTWARE MAKES TRADITIONAL BACKUP OBSOLETE
DATE: October 9, 1995 08:31 EDT WORD COUNT: 1,303

6/3,AB/35 (Item 1 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2001 The Gale Group. All rts. reserv.

08354071 Supplier Number: 70379815
Revit 2.0.(CAD software evaluaton) (Software Review) (Evaluation)
Laiserin, Jerry
Cadence, v16, n2, p22
Feb, 2001
Language: English Record Type: Fulltext
Article Type: Evaluation
Document Type: Magazine/Journal; Trade
Word Count: 2454

6/3,AB/36 (Item 2 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2001 The Gale Group. All rts. reserv.

07303069 Supplier Number: 61881305
Ready For Market!(Industry Trend or Event)
Computer Telephony, v8, n4, p120
April, 2000
Language: English Record Type: Fulltext
Document Type: Magazine/Journal; Trade
Word Count: 14848

6/3,AB/37 (Item 3 from file: 16)

DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2001 The Gale Group. All rts. reserv.

06467047 Supplier Number: 55009050

WIN 100 Hardware/ Software -- We scoured the market to select the 100 best hardware and software products of the year. You'll find newcomers along with updates of old favorites, all with one common trait: Each is the best in its class. (Buyers Guide)

Windows Magazine, p102

July 1, 1999

Language: English Record Type: Fulltext Abstract

Article Type: Buyers Guide

Document Type: Magazine/Journal; General Trade

Word Count: 7846

ABSTRACT:

Windows Magazine's Win100 awards identify 100 of the best hardware and software products in the Windows industry. The 1999 awards identify the Compaq Prosignia as the Hardware Product of the Year and Symantec's Norton AntiVirus 5.0 as the Software Product of the Year. Digital Subscriber Line technology is named as the Technology of the Year, while 3Com's US Robotics 56K Faxmodem is named as the top Communications Hardware product. The Nikon coolpix 950 tops the list of digital cameras and the EIZO Nanao FlexScan L360 is the top display. The NEC MobilePro 770C H/PC is the best handheld device.

6/3,AB/38 (Item 4 from file: 16)

DIALOG(R)File 16:Gale Group PROMT(R)

(c) 2001 The Gale Group. All rts. reserv.

05635788 Supplier Number: 50067755

NetDynamics 4.1 Delivers Superior Application Server Integration And Scalability; Enhanced Development Features

PR Newswire, p609SFTU044

June 9, 1998

Language: English Record Type: Fulltext

Article Type: Article

Document Type: Newswire; Trade

Word Count: 732

6/3,AB/39 (Item 5 from file: 16)

DIALOG(R)File 16:Gale Group PROMT(R)

(c) 2001 The Gale Group. All rts. reserv.

04994451 Supplier Number: 47335570

Apptivity Ships First Java Development Tool for Creating Thin Client, Multi-Tiered, Database Applications

PR Newswire, p0428SFM106

April 28, 1997

Language: English Record Type: Fulltext

Document Type: Newswire; Trade

Word Count: 1536

6/3,AB/40 (Item 6 from file: 16)

DIALOG(R)File 16:Gale Group PROMT(R)

(c) 2001 The Gale Group. All rts. reserv.

04819796 Supplier Number: 47092541

Apptivity Introduces First Java Development Tool for Creating Scalable, Multi-Tiered, Database Applications.

Business Wire, p02031200

Feb 3, 1997

Language: English Record Type: Fulltext

Document Type: Newswire; Trade

Word Count: 1413

6/3,AB/41 (Item 7 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2001 The Gale Group. All rts. reserv.

02631346 Supplier Number: 43502394
ACI SHIPS 4D SERVER
News Release, p1
Dec 4, 1992
Language: English Record Type: Fulltext
Document Type: Magazine/Journal; Trade
Word Count: 853

6/3,AB/42 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

13217485 SUPPLIER NUMBER: 71760941 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Do combo chips compute (or even compile)? (Technology Information)
Dipert, Brian
EDN, 46, 4, 101
Feb 15, 2001
ISSN: 0012-7515 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 5936 LINE COUNT: 00494

6/3,AB/43 (Item 2 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

12663680 SUPPLIER NUMBER: 65858648 (USE FORMAT 7 OR 9 FOR FULL TEXT)
EDN's 27th annual MICROPROCESSOR/MICROCONTROLLER DIRECTORY. (Buyers Guide)
EDN, 45, 19, 54
Sept 14, 2000
DOCUMENT TYPE: Buyers Guide ISSN: 0012-7515 LANGUAGE: English
RECORD TYPE: Fulltext
WORD COUNT: 25297 LINE COUNT: 02062

6/3,AB/44 (Item 3 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

12056927 SUPPLIER NUMBER: 61872547 (USE FORMAT 7 OR 9 FOR FULL TEXT)
dsp directory 16 bits. (Buyers Guide)
EDN, 45, 7, 62
March 30, 2000
DOCUMENT TYPE: Buyers Guide ISSN: 0012-7515 LANGUAGE: English
RECORD TYPE: Fulltext
WORD COUNT: 16676 LINE COUNT: 01348

6/3,AB/45 (Item 4 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

11738181 SUPPLIER NUMBER: 59269914 (USE FORMAT 7 OR 9 FOR FULL TEXT)
THE SLAMMIN,' JAMMIN' DRAM SCRAMBLE. (Technology Information)
Dipert, Brian
EDN, 45, 2, 68
Jan 20, 2000
ISSN: 0012-7515 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 8965 LINE COUNT: 00734

6/3,AB/46 (Item 5 from file: 148)
DIALOG(R) File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

10633941 SUPPLIER NUMBER: 20762999 (USE FORMAT 7 OR 9 FOR FULL TEXT)
NetDynamics 4.1 Delivers Superior Application Server Integration And Scalability; Enhanced Development Features
PR Newswire, p609SFTU044
June 9, 1998
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 747 LINE COUNT: 00075

6/3,AB/47 (Item 6 from file: 148)
DIALOG(R) File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

09250849 SUPPLIER NUMBER: 19088670 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Apptivity Introduces First Java Development Tool for Creating Scalable, Multi-Tiered, Database Applications.
Business Wire, p2031200
Feb 3, 1997
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 1537 LINE COUNT: 00139

6/3,AB/48 (Item 7 from file: 148)
DIALOG(R) File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

09100002 SUPPLIER NUMBER: 18858800 (USE FORMAT 7 OR 9 FOR FULL TEXT)
A real change of face. (Novell's IntranetWare provides upgrades in managing NetWare networks) (Product Development)
Gaskin, James E.
InformationWeek, n604, p50(3)
Nov 4, 1996
ISSN: 8750-6874 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1347 LINE COUNT: 00111

ABSTRACT: Novell's IntranetWare is a direct descendent of NetWare 4.11 with the inclusion of Internet support. IntranetWare's main improvements over NetWare 4.11 concentrate on the NetWare Directory Services (NDS). IntranetWare enlists the NDS Manager, a 32-bit graphical management application, to replace certain C-Worthy NDS management tools. IntranetWare distributes the NDS Manager as a separate program or as an option on the NetWare Administrator Tools menu. This option can be set up by editing a text file. IntranetWare also adds systems management features within the NetWare Administrator by providing the ability to add other tools. IntranetWare incorporates the IPX/IP Gateway, the Multi -Protocol Router, and FTP Server. IntranetWare and NetWare 4.11 both contain a graphical management tool within the Web Server which permits setting access privileges for NetWare users and Internet clients.

6/3,AB/49 (Item 8 from file: 148)
DIALOG(R) File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

08184264 SUPPLIER NUMBER: 17551943 (USE FORMAT 7 OR 9 FOR FULL TEXT)
STAC REPLICA SOFTWARE MAKES TRADITIONAL BACKUP OBSOLETE
PR Newswire, p1010LA001B
Oct 10, 1995
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 1218 LINE COUNT: 00118

6/3,AB/50 (Item 9 from file: 148)
DIALOG(R) File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

08005041 SUPPLIER NUMBER: 17296162 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Vendors revamp database price policies. (Microsoft, Sybase Inc, Oracle Corp and Informix Software Inc)
Ricciuti, Mike
InfoWorld, v17, n29, p25(2)
July 17, 1995
ISSN: 0199-6649 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 669 LINE COUNT: 00056

ABSTRACT: Database vendors, including Microsoft, Sybase Inc and Oracle Corp, are considering moving from a per-seat licensing model to a per-named-user model to offer customers more flexibility. The possible shift is in response to the move from client/server-based DBMSs to multi-tier, partition-based DBMS models. A per-named-user model would provide more flexibility for single users who access multiple databases partitioned across several servers. The per-named-user model would be most cost-effective for small IS departments with about 10 users, but larger operations would pay more under the per-named-user model than under the current per-seat model. Sybase is conducting customer interviews to determine the effects of a potential move. Oracle and Microsoft have already introduced per-named-user licensing models as options for its customers.

6/3,AB/51 (Item 10 from file: 148)
DIALOG(R) File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

07985739 SUPPLIER NUMBER: 17251248 (USE FORMAT 7 OR 9 FOR FULL TEXT)
DAC attacks designer issues. (Design Automation Conference) (includes related articles)
Maliniak, Lisa
Electronic Design, v43, n12, p63(9)
June 12, 1995
ISSN: 0013-4872 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 6915 LINE COUNT: 00596

ABSTRACT: The 1995 Design Automation Conference will be held on Jun. 12-16, 1995 at the Moscone Center in San Francisco, CA. Organizers have again opted to place emphasis on designer issues. Included in the event is a three-day Designer Track practicum for engineers searching for design-methodology solutions for electronic devices and systems. Commercial products from more than 125 vendors will also be showcased during the conference.

6/3,AB/52 (Item 11 from file: 148)
DIALOG(R) File 148:Gale Group Trade & Industry DB
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07853145 SUPPLIER NUMBER: 16941082 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Server network interface cards: the PCIs (almost) have it. (12 boards reviewed) (includes related articles on a results summary, Fast Ethernet, driver problems and test methods) (Hardware Review) (Evaluation)
Mace, Scott; Wonnacott, Laura; Symoens, Jeff; Chapin, Rod; Sercan, Ayse
InfoWorld, v17, n19, p68(10)
May 8, 1995
DOCUMENT TYPE: Evaluation ISSN: 0199-6649 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 10536 LINE COUNT: 00861

ABSTRACT: A review of 12 PCI-bus Ethernet adapters indicates that these devices deliver stronger performance than older EISA and VESA technology,

but the device drivers issued by vendors need to be updated for the new cards. Cogent Data Technologies' eMaster+ EM964 Quartet earns top honors for its fine design and affordable pricing at \$124 per port. The Znyx EtherAction ZX312 and EtherArray ZX315 also placed well in the competition, nabbing the second and third positions respectively. Most of the boards are single port, although Cogent's winning product has four ports and the third-place Znyx features two PCI ports. All of the devices tested turned in respectable application script processing speeds that are about 25% faster than those observed in EISA cards. Unfortunately, PCI boards demand more CPU resources, and five of the 12 units tested were shipped with out-of-date drivers that made installation and configuration difficult.

6/3,AB/53 (Item 12 from file: 148)

DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

07601913 SUPPLIER NUMBER: 16316039 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Beyond NetWare 3.12. (IBM's LAN Server 4.0 Advanced, Novell's NetWare 4.1 and Microsoft's Windows NT Server 3.5 network operating systems)
(includes related articles on summary, test methodology, testing adjustments, workload explanation, security tools, NOS speed enhancements, HP's NetServer and symmetric multiprocessing) (Software Review) (Evaluation)

Ward, Rob; Laitinen, Mauri; Eva, Elizabeth

InfoWorld, v16, n51, p66(10)

Dec 19, 1994

DOCUMENT TYPE: Evaluation ISSN: 0199-6649 LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 11747 LINE COUNT: 00931

ABSTRACT: IBM's LAN Server 4.0 Advanced, Novell's NetWare 4.1 and Microsoft's Windows NT Server 3.5 network operating systems offer administrators three excellent choices, but NetWare 4.1 garners top honors. Despite differences, each of the three NOS versions employ a core set of common features. LAN Server 4.0 and Windows NT Server 3.5 offer users nearly unattended installation and NetWare is not far behind. Each NOS provides better administration capabilities through enhanced tools, especially NetWare 4.1. NetWare and Windows NT employ C2-level security features designed by the Dept of Defense for improved data security. All three NOSs offer multi-protocol support that improve enterprise capabilities. NetWare 4.1 won the top rating partly because of its flexibility and because of its improved administration capabilities.

6/3,AB/54 (Item 13 from file: 148)

DIALOG(R)File 148:Gale Group Trade & Industry DB
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07170623 SUPPLIER NUMBER: 14698402 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Computer software and networking. (Industry Overview)

Smolenski, Mary; Montgomery, Shelagh; Swann, Vera A.; Davin, Mary

U.S. Industrial Outlook, p27-1(16)

Annual, 1994

DOCUMENT TYPE: Industry Overview ISSN: 0083-1344 LANGUAGE:

ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 15620 LINE COUNT: 01305

AUTHOR ABSTRACT: Revenues of the U.S. **software** industry should continue to grow strongly in current dollars in 1994. U.S. suppliers benefitted from their leading position in the world market and the continuing demand from users to harness the power of their computer systems more effectively.

6/3,AB/55 (Item 14 from file: 148)

DIALOG(R)File 148:Gale Group Trade & Industry DB
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06772530 SUPPLIER NUMBER: 14502928 (USE FORMAT 7 OR 9 FOR FULL TEXT)
NetWare Loadable Modules for CD-ROM networking. (Software Review)
(Evaluation)
Starr, Karen J.
CD-ROM Professional, v6, n6, p82(5)
Nov, 1993
DOCUMENT TYPE: Evaluation ISSN: 1049-0833 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 2912 LINE COUNT: 00226

ABSTRACT: Five NetWare Loadable Module **software** packages, device drivers for CD-ROM server-based CD-ROM drives shared over a network running on NetWare, are reviewed. These are Micro Design International Inc's SCI Express, Corel Systems Corp's CorelSCSI! and CorelSCSI Pro!, Meridian Data Inc's CD Net for NetWare and Online Computer Systems Inc's and OPTI-NET NLM. General advantages and disadvantages of of NetWare Loadable Modules are discussed.

6/3,AB/56 (Item 15 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

06515041 SUPPLIER NUMBER: 13744569 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Server takes 4D to new dimensions: database solution pairs ease, efficiency. (ACI US Inc.'s 4D Server database server) (includes related article on ZD Labs' test methodology and Benchmarks) (Software Review)
(Evaluation)
Male, Mel
MacWEEK, v7, n16, p47(3)
April 19, 1993
DOCUMENT TYPE: Evaluation ISSN: 0892-8118 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 2052 LINE COUNT: 00165

ABSTRACT: ACI US Inc's \$895-for-single-user 4D Server 1.01 data base management system (DBMS) server is a powerful and useful program. The **software** is designed for use with the 4th Dimension (4D) 3.0, one of the most popular relational DBMSs. **Software** was tested for installation, maintenance and performance, and the manufacturer's claims were shown to be accurate. The package is complete, containing **software** for the clients as well as the server, plus database programming **software** included in 4D 3.0. ACI claims that only 1.5Mbytes of RAM are necessary, but users will need significantly more RAM for the program to run properly. The DBMS uses time-sliced multitasking, which lets users operate several database functions at once. The interface is clear and simple to use, consisting of a Process window plus File, Process and Backup pull-down menus. Installation is easy.

6/3,AB/57 (Item 16 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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05441021 SUPPLIER NUMBER: 11238218 (USE FORMAT 7 OR 9 FOR FULL TEXT)
"Over there" for fun and profit. (Trade Shows)
Szathmary, Richard
Sales & Marketing Management, v143, n11, p161(2)
Sept, 1991
CODEN: SMMAD ISSN: 0163-7517 LANGUAGE: ENGLISH RECORD TYPE:
FULLTEXT; ABSTRACT
WORD COUNT: 20090 LINE COUNT: 01753

ABSTRACT: American companies must deal with different issues when participating in international trade shows in Europe. Two experts discuss strategies for exhibiting abroad.

6/3,AB/58 (Item 17 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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04846502 SUPPLIER NUMBER: 09580333 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Title fight. (Software Review) (Novell's NetWare 386 3.1 and Microsoft's
LAN Manager 2.0 local area network; includes related article on problems
in installing a network) (evaluation)
Moss, David
PC User, n143, p52(7)
Oct 10, 1990
DOCUMENT TYPE: evaluation ISSN: 0263-5720 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 5468 LINE COUNT: 00418

ABSTRACT: A review and comparison of Microsoft Corp's LAN Manager 2.0 and
Novell Inc's NetWare 386 3.1 network operating systems extols both products
but favors LAN Manager 2.0 because of its far lower price. Novell has the
dominant position in a market that will grow from the current 20 percent of
all microcomputers networked to 50 percent networked by 1995. Microsoft,
though, is rapidly increasing its dealer and user base. LAN Manager 2.0
(795 pounds sterling for five users) is rated excellent for installation,
ease of use, ease of network administration and functionality. The
software provides both file server and client-server networking support;
UNIX and VAX VMS versions are available. NetWare 386 3.1 (5,995 pounds
sterling for up to 250 users) is rated excellent for ease of network
administration and functionality. Other versions support VMS and Macintosh
environments.

6/3,AB/59 (Item 1 from file: 20)
DIALOG(R)File 20:World Reporter
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01616489
PROGRESS SOFTWARE: Progress Software Corporation ships Apptivity 2.1
M2 PRESSWIRE
May 11, 1998
JOURNAL CODE: WMPR LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 670

Features outstanding performance and quality enhancements for
developing and deploying business-critical, cross-platform Java
applications

1998-Progress Software Corporation (NASDAQ:PRGS), a leading supplier
of application development tools, database technology and support services
for business applications, today announced Apptivity 2.1, the latest
version of its popular application server and development tool for Java.
Apptivity 2.1 incorporates a number of new features for creating
business-critical, cross-platform business applications for the web. Noted
features include HTTP tunneling for improved deployment of web
applications; an expanded database driver set; and enhanced quality and
scalability.

?

PLEASE ENTER A COMMAND OR BE LOGGED OFF IN 5 MINUTES
?type s6/9/53

6/9/53 (Item 12 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2001 The Gale Group. All rts. reserv.

07601913 SUPPLIER NUMBER: 16316039 (THIS IS THE FULL TEXT)
Beyond NetWare 3.12. (IBM's LAN Server 4.0 Advanced, Novell's NetWare 4.1
and Microsoft's Windows NT Server 3.5 network operating systems)
(includes related articles on summary, test methodology, testing

adjustments, workload explanation, security tools, NOS speed enhancements, HP's NetServer and symmetric multiprocessing) (Software Review) (Evaluation)

Ward, Rob; Laitinen, Mauri; Eva, Elizabeth

InfoWorld, v16, n51, p66(10)

Dec 19, 1994

DOCUMENT TYPE: Evaluation

ISSN: 0199-6649

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 11747 LINE COUNT: 00931

ABSTRACT: IBM's LAN Server 4.0 Advanced, Novell's NetWare 4.1 and Microsoft's Windows NT Server 3.5 network operating systems offer administrators three excellent choices, but NetWare 4.1 garners top honors. Despite differences, each of the three NOS versions employ a core set of common features. LAN Server 4.0 and Windows NT Server 3.5 offer users nearly unattended installation and NetWare is not far behind. Each NOS provides better administration capabilities through enhanced tools, especially NetWare 4.1. NetWare and Windows NT employ C2-level security features designed by the Dept of Defense for improved data security. All three NOSs offer multi-protocol support that improve enterprise capabilities. NetWare 4.1 won the top rating partly because of its flexibility and because of its improved administration capabilities.

TEXT:

LAN Server and NT Server are vastly improved, and NetWare 4.1 is what 4.0x should have been in the first place. At long last, network administrators no longer have to live in a one-NOS town.

If they were computers, goes the popular analogy, cars would go faster, cost next to nothing, and get hundreds of miles to the gallon. Fortunately for commuters, cars are not computers. If they were, they would crash every day. If you wanted to change a flat tire, you would discover that the owner's manual contained a treatise on lug-nut design but no instructions on where to find the jack. Perhaps worst of all, you would always need a skilled mechanic (Certified Driving Engineer) riding shotgun.

Networking PCs is becoming an inevitable headache for more and more businesses. What's truly exciting about the three network operating systems reviewed here is that for the first time the right folks have the headache: the vendors. This is the only reasonable division of labor: NOS vendors figure out how to build a faster, more reliable engine, while network administrators spend more time on the information highway and less in the shop.

The defining milestone in this new era is NetWare 3.x's passage from default choice to only one of several viable products. The reigning network operating system for years despite considerable flaws, NetWare 3.x is no longer the only NOS worth considering, or even the fastest, which is one of the reasons we didn't include Version 3.12 in this comparison except as a baseline for speed. Deciding on a NOS will be harder now that there are more choices, but we don't think users are going to complain too much. From installation to administration, these NOSes are simply better and easier than ever before.

WHAT KIND OF TOOL AM I? The fundamental architecture and design goals of these products remain much as they were in previous versions. Novell Inc. built NetWare 3.x from the ground up to provide file and print services to large numbers of users, based on a small, fast kernel. The company added a sophisticated directory-services layer to NetWare 4.01 for enhanced administration capabilities, which it finally brings up to full speed in Version 4.1.

IBM and Microsoft Corp. designed LAN Server and Windows NT Server to be more things to more people, providing not only file and print services, but also including the sorts of features -- such as symmetric multiprocessing (SMP) support, pre-emptively scheduled threads, process protection, interprocess communication, and virtual memory -- that are the hallmarks of good application servers. We were impressed by how fast these products' file and print services have become.

Despite their inherent differences, each of the new versions of the products under review here has implemented a common set of features and functionality important to most users. Together, the improvements define a

baseline for NOS success in contemporary business environments.

- * Easier installation. Whether an administrator has years of experience managing hundreds of servers or is a newcomer building a departmental LAN, fast and simple installation saves the company money. LAN Server 4.0 Advanced and Windows NT Server 3.5 have both come close to the ideal of unattended installation. Even Novell, which in the past has seemed philosophically wedded to the notion of difficult installations, has reformed.

- * Easier administration. In 1844, Ralph Waldo Emerson jotted down some thoughts that seem pertinent in a world still dominated by NetWare 3.12. "Expecting nothing," he wrote, "I am always full of thanks for moderate goods." In that spirit, administrators have something to be thankful for, because the administrative tools in these new products show a marked improvement over past offerings and are often easy to learn and use. (This is particularly true of NetWare 4.1's NWADMIN utility and LAN Server's use of OS/2 objects.)

Plenty of room for improvement remains, however. With a few exceptions, the tools are not very well integrated, and some of them are amateurishly designed, lacking the interface features that have become commonplace in other commercial applications (such as default settings in dialog boxes), to say nothing of more sophisticated interface elements such as wizardlike helpers.

On the architectural side, administrative capabilities have improved noticeably.

Domain-based architecture is not exactly the wave of the future, but LAN Server and NT Server have beefed it up -- in different ways -- to a level approaching shouting distance of centralized administration. NetWare 4.1, which actually does provide centralized administration, looks more like what we can expect to see of future NOS designs.

- * Better security. User authentication with Version 3.x and earlier of NetWare was less than adequate. Although Version 3.12 now has a password-encryption option, the other products employ RSA-style authentication, in which a random-value key is sent by the server, encrypted on the client side by the password, and sent back to the server for verification, so the password itself never travels over the wire.

Both NetWare 4.1 and NT Server 3.5 implement C2-level security, a specification designed by the Department of Defense for military computers (see story, page 76). It is questionable whether anyone will ever actually sit behind an officially C2-certified system, because the rating applies only to specific combinations of hardware and NOS, and the certification period -- two years -- is just long enough to constitute a form of planned obsolescence. Moreover, C2 is designed with specifically military needs in mind and, although these are not necessarily incompatible with business needs, neither are they identical. For instance, C2 is not especially strong in addressing the security problems of enterprisewide networks.

- * Enterprise capability. Transport protocols have always been a defining aspect of NOSes. This year all three vendors appear to be aware of that fact and are shipping more of what their customers actually want and less of what they want them to want. The three new products all provide a form of multiple-protocol support.

Closely related to this is the fact that, except for NetWare 3.12, vendors are positioning NOSes not as LAN products anymore but as enterprise products. In this context, enterprise has one meaning: routing -- the task of herding data reliably from point A to point B irrespective of physical location. In order that their products can be more easily adopted by large companies with PCs in disparate locations, all three vendors now provide a routable protocol stack (chiefly TCP/IP).

BEST-LAID PLANS. Companies that need to expand their networks have several choices: they can remain a NetWare 3.12 shop; standardize on a different NOS and migrate their servers; or create a mixed network in which the original servers remain unchanged, but additional servers run one or more of the new products compared here.

We based the test plan for this comparison on the scenario of expanding a NetWare 3.12-based network with other NOSes, with interesting results (see the NetWare integration scoring category on page 74).

To evaluate the speed of these NOSes, we let the vendors make reasonable tuning adjustments before running our tests on 20 and 40

clients. Surprisingly, those tweaks, described on page 76, didn't always significantly improve performance over the "out-of-the-box" tests we ran.

Hot off the dupe machine, NetWare 4.1 barely made our deadline; it formally shipped only two weeks ago, just as we were finishing testing. The copy we reviewed was one of the last gold versions of the product. No changes were made to the core code before the product shipped, according to the vendor.

Product Overview

LAN Server 4.0 Advanced

IBM's LAN Server 4.0 Advanced is so much improved over previous versions that IBM should simply give it a new name. Its easy installation option equals Microsoft Corp. Windows NT Server's analogous express installation for speed and simplicity, and the system takes advantage of OS/2's object-oriented capabilities to provide a strong new set of graphical administration tools.

For moderate file-and-print service loads, LAN Server has revved its performance considerably. Its support of the new symmetric multiprocessing version of OS/2 2.11 allows it to handle CPU-intensive applications better than ever, assuming you're using a multiprocessor system.

IBM has enhanced LAN Server's enterprisewide networking capabilities by including an improved TCP/IP protocol stack (easily configurable as the default) and aliasing features that allow easier management of resources across workgroups and domains. LAN Server is unique among the network operating systems here for including a scripting language, the powerful Rexx.

We tested the Advanced version of LAN Server, which comes with the High Performance File System (HPFS). LAN Server also comes in a less expensive Entry version, which lacks HPFS and is intended for smaller networks where performance is of less concern than price.

NetWare 4.1

NetWare's primary design goal remains fast file-and-print services for large LANs, and as our file-and-print services benchmark shows, it succeeds admirably in NetWare 4.1. To this, Novell Inc. has added a second major design goal: easier administration. This is partly the result of a Novell customer survey that showed that 70 percent of the cost of ownership of NetWare 3.x was administrative.

Novell's solution consists of a network structure based on a set of X.500 conventions called NetWare Directory Services (NDS), which made its debut in Version 4.00 to a less-than-enthusiastic reception, even among confirmed NetWare users. Although widely acknowledged to be a potentially powerful and sophisticated means of administering large networks, NDS lacked a crucial feature: the capability to make significant changes to the directory structure once it had been defined.

Version 4.1 remedies this oversight; NDS now delivers the most robust administration scheme of the NOSes we tested. Novell significantly augments this administrative power with a new utility called NetSynch, which allows a NetWare 4.1 server to administer as many as 12 NetWare 3.x servers by adding them to the NDS context. Users can access this functionality through a new GUI-based utility called NWADMIN, which presents the whole network visually.

After you use NWADMIN, the server operator's console comes as a shock. Mysterious bulletins that you cannot pause or capture (until well into the start-up process) scroll up the screen. This is probably for the best, because the uninitiated will never be able to discern bland informational lines from critical error messages. For aging computer operators, it's a heady draft of nostalgia. Turn up the air conditioning, add a clacking teletype, and you'll find yourself transported back 20 years to the console of an old mainframe.

For wide-area connectivity, Novell suggests using its IPX protocol with NetWare Link Services Protocol; Novell includes a coupon for NetWare Internet Protocol (IP) as well.

Though it doesn't offer them in a tightly integrated suite, Version 4.1 also introduces a number of tools for configuring and monitoring the network, such as INETCFG and SERVMAN.

NetWare 4.1 continues to support RAID Levels 0 and 1 in both mirrored and duplexed configurations, and now bundles Novell's own System Fault Tolerance III **software**, though you must pay an extra activation fee.

Windows NT Server 3.5

It is faster and simpler to create a functioning network with Microsoft's Windows NT Server 3.5 than with any of the other products we tested in this comparison.

NT Server also holds the title of most improved. It performed our file-and-print services benchmark nearly twice as fast as the disappointing NT Server 3.1 did.

Microsoft bundles an improved IPX stack as NT Server's default protocol and offers an improved version of TCP/IP.

NT Server has also taken a giant step by providing an automated IP-address pooling service that automatically allocates IP addresses to clients without **user** intervention, regardless of the **user**'s location on the network.

Also new is a migration utility that copies the bindery information and data volumes from a NetWare 3.12 server onto an NT Server 3.5 machine. If you don't want to go that far, you can plug into an existing NetWare server directly from a client machine or via a NetWare gateway located on the NT Server server.

NT Server's network administrative scheme revolves around domain directory services. In order to avoid the administrative nightmare of maintaining separate **user** accounts on different servers, you can establish trust relationships between domain directories to allow users a single networkwide log-in.

New to this version is the capability to administer the network either from a 16-bit or 32-bit client workstation or from a remote workstation, independent of the protocol running on the client.

Installation and client configuration

LAN Server 4.0 Advanced: Very Good

LAN Server provides two installation options: easy and tailored. The easy option really is; it's quick and simple. The tailored option allows you greater flexibility in specifying the configuration but requires low-level knowledge of your hardware that may mean some homework. (Quick! Does your server's disk drive use 24-bit direct memory access?)

LAN Server does not support the NE3200 network interface card (NIC), which prompted us to switch to Compaq NetFlex II EISA Ethernet cards for all the NOSes. (IBM's stated aim is to support 90 percent of Token Ring cards but only 70 percent of Ethernet cards.)

IBM continues its obsession with acronyms. In the course of the installation we found help screens littered with references to MPTS, NIF, DASD, and other product-specific acronyms, which are seldom explained in context and often are not to be found in the on-line glossary. (MPTS, by the way, stands for multiprotocol transport service; NIF is network information file; and DASD, a mainframe term for hard disks that apparently no one but IBM uses, stands for data access storage device.)

During benchmark testing, we discovered that a bug in the DOS requester prevented two of our DOS applications -- Paradox 3.5 and Harvard Graphics 3.0 -- from launching. IBM supplied us with a new, compatible version that worked with our applications and is available to users through IBM's usual problem-solving channels.

The interface that LAN Server provides for setting up client machines is only slightly worse than NT Server's. Administrators must purchase a separate product to be able to install requester **software** across the wire, but the option that creates installation disks works easily, detects hardware accurately, and creates a handy log-on screen. The client requester installation for Windows assumes Windows 3.1; if you're running Windows for Workgroups 3.11, you must rename some DLLs and make some other simple but obscure changes (all of which you can automate with a simple batch file). You can use the requester that comes with Windows for Workgroups 3.11, but you must use the LAN Server requester if you want to use aliasing or public applications, two of the NOS' stronger features.

NetWare 4.1: Good

Novell has somewhat improved NetWare 4.1's installation over that of Version 3.12. A "simple" CD-ROM installation assumes an existing DOS **partition** with at least 15MB of space and a working CD-ROM drive. It chooses a default volume name and IPX network number, then uses the remaining free disk space to create a single NetWare **partition** with a SYS volume that has a single-organization NetWare Directory Services tree.

According to Novell, most administrators want total control of server configuration, so NetWare 4.1 offers limited hardware detection and the administrator must confirm every choice. Both the simple and custom installations require detailed knowledge of the hardware, including I/O port and interrupt request values for the disk controllers and NICs.

By contrast, installing Version 4.1's client **software** was a snap. We still had to use the downloaded EtherExpress driver, but otherwise the installation took little effort. Users can now configure CD-ROM-equipped client machines directly from the installation CD.

Windows NT Server 3.5: Excellent

Like any Microsoft product, NT Server offers both custom and express installation options; we found both to be fast, simple, and straightforward. The system had no problem recognizing our hardware, which included Adaptec 7770 and 1542 cards, a Mylex DAC960 redundant array of inexpensive drives controller, and four NE3200 NICs (and later -- when we switched NICs -- four Compaq NetFlex II EISA Ethernet cards). We completed the express installation successfully simply by accepting the defaults. The custom option allowed us to select and configure many of the services we review in subsequent tasks.

A utility new to Version 3.5 is the Network Client Administrator (NCA), which provides several ways to install client-requester **software**. Unfortunately, NCA's interface and help screens are ambiguous. It also presented us with a surprising number of error messages when we accepted defaults.

The handiest option has you specify the client-side NIC, then creates a boot disk that connects the client machine to the server and performs an across-the-wire installation of Windows for Workgroups or Microsoft Network Client for MS-DOS.

Redirector choices include real- and protected-mode DOS requesters in full and basic versions (posing a tastes-great, less-filling trade-off), and a 32-bit TCP/IP stack originally developed for Chicago, as well as for the DOS and OS/2 versions of LAN Manager. The system supports a broad range of NICs. Microsoft's SMC Elite 16 Combo driver, however, would not work over IPX. We had to use the driver that SMC ships with the card until Microsoft could provide us with a fix.

Administration: establishing users

LAN Server 4.0 Advanced: Very Good

Because virtually all aspects of the network appear as objects to LAN Server, creating and managing them is a quick and flexible process. If the OS/2 desktop is new to you, it may take some time to learn but will be worth the effort. Its drag-and-drop functionality makes for very fast and easy **user** -account management and resource sharing. This use of OS/2 objects and templates is one of LAN Server's greatest strengths. In addition, LAN Server satisfies power users who prefer a command line over a mouse and icons by granting the Rexx scripting language access to the LAN Server API.

IBM supplies an adequate number of privilege levels in addition to **user** and administrator, though none is customizable and administrative control over password use is minimal at best. The system also lacks a way to restrict log-on hours from the graphical administration tools, but you can do so from the command line.

We particularly liked the capability to specify limits to disk usage in users' home directories. When the limit is reached, both administrator and **user** are notified (the system continues to allow further writes to the disk, so data is not at risk).

LAN Server gives administrators **user** -access profiles to grant access to and restrict usage of system resources. Just when administrators were getting used to objects, IBM throws them a form to fill out; fortunately, it's fairly simple.

Just as we were about to give the Stupidest Error Message of the Whole Comparison award to NT Server, we tried saving some changes we made to a **user** account on LAN Server, and got this message: "The parameter is incorrect." Dozens of parameters for a **user** account are scattered through a number of pages in the tabbed dialog. This help screen is also worth noting: "Cause unknown; consult the documentation." As we were pondering how to look up an unnamed problem with an unknown cause, we suddenly realized that, contrary to myth, **software** developers do have a sense of

humor.

You can create a single networkwide log-on for a **user**, as well as centralized administration, though the process involves more steps than with NetWare or NT Server. A single log-on for a domain is simple to generate, but then you must create an identical log-on for each additional domain; this isn't ideal, but it's a big improvement on the one server, one log-on scenario. Separate log-ons are not necessary for each domain as long as the password and **user** ID are consistent. (An optional application, Net Signon, lets you synchronize IDs and passwords across domains.) LAN Server's aliasing scheme has networkwidescope, allowing servers on one domain to see resources on others.

There are limits to your ability to perform centralized administration. From the graphical interface, you can administer a maximum of six domains; from the command line, however, you can administer all domains.

NetWare 4.1: Excellent

NetWare 4.1's new capabilities and GUI-based administration tools are a boon to administrators of both large and small networks. Full-time administrators receive the power they need to keep up with organizational changes, and part-time administrators don't have to master a plethora of obscure commands.

Versions 2.x and 3.x of NetWare relied on the system's bindery database to keep track of network objects such as file servers, printers, routers, gateways, groups, and users. In Version 4.0, the NetWare Directory Services (NDS) database replaced the bindery. In its simplest form, NDS can act as a flat database, such as the bindery, or it can take the form of a complex tree incorporating multiple servers, locations, and even countries.

You can **partition** the NDS database across multiple servers for fault tolerance and manageability. This means that different locations can administer their own areas, and the network database scales up without becoming unwieldy.

One of the drawbacks in the 4.0x NDS was the incapability to move or rename subtrees or merge two separate trees. This meant that changing a group such as Marketing to Mktg or moving it to a different location required deleting and then re-creating it. Because changes were so difficult to implement, administrators had to plan the NDS structure carefully and limit subsequent alterations. NetWare 4.1 removes these restrictions. For administrators of large networks, changing the network to reflect the corporate organization is now a quick and easy task.

NWADMIN, a Windows tool, displays the NDS database as a tree, with every object type represented as a descriptive icon, allowing you to create and delete objects, move them, and change their properties. Double-clicking on an object brings up a properties dialog box. To insert a new **user**, for example, just highlight the new **user**'s group and select the Create button. It brings up a dialog box in which you can enter the appropriate information about the new **user**.

You can also define a template that defines groupwide properties. Each **user** created under the template automatically receives the properties. From the template, you can define passwords and password restrictions, hours of use, printers, home directories, and log-in scripts. Although the administrator can change any **user**'s properties and rights to objects, the templates and NDS' inherited-rights structure simplify the task of creating consistent **user** accounts.

Multiple log-in scripts let administrators tailor each department's and each **user**'s environment. Every organizational unit can have a log-in script, so a **user** belonging to a hierarchy of organizational units will execute all of the scripts. Each script can be edited from NWADMIN.

To move a **user** to a different group with NWADMIN, just highlight the **user**'s icon and pick the Move menu, or drag and drop the icon. A dialog box appears listing permissible moves. Moving a whole group, a server, or any other object is also easy. NWADMIN allows you to combine two separate trees using DSMERGE, a separate server console utility.

Novell has made the process of configuring network protocols, network interface cards, and interfaces significantly easier in NetWare 4.1 by combining the operations into a single utility, INETCFG. The company has also added other network monitoring and testing utilities to make the administrator's life more bearable.

Windows NT Server 3.5: Good

NT Server 3.5's **User Manager** provides quick and relatively painless access to most **user** account tasks. You can specify a home directory on the **user**'s machine or map a drive letter to a server directory, although the inexplicable absence of a Browse button makes this an error-prone chore.

We encountered warnings that the server could not create new directories that we specified for **user** home directories when we failed to set up the **user** account in precisely the (undocumented) correct order. The "invalid path name" error message we got when we specified "c:\users\paula" as a home directory on the server struck us as just plain weird. The directory of that name showed up in the File Manager, but the **User Manager** insisted we use the \\servername\path convention. It's just as easy to tell the **user** what convention to use as it is to say, "Sorry, you can't do that," so why the secrecy? (The Help button in the **user** -environment profile screen under the **User Manager** does state that users need to follow the Universal Naming Convention pathname.)

We also experienced difficulties with root mapping. We mapped \\...\subdir to drive X; on the client machine, drive X appeared as X:\subdir rather than just X:. The remedy to this problem was simple: We just established a share first on the parent directory, then we could map any number of directories under that share. Microsoft could make the interface much clearer about the order in which to proceed.

The **User Administrator** provides an impressive number of predefined access types beyond the traditional administrator, **user**, and guest, and you can also create custom types. Administrators can easily restrict hours of access, limit the number of machines a **user** can log on from, and manage log-in scripts and **user** profiles. Passwords are also easily managed. You can specify policies such as length of a password, uniqueness, aging, how often users must change passwords, and the number of log-on attempts to allow. Microsoft does not, however, offer more advanced password administration, such as disallowing the use of a **user**'s own name, as NetWare 4.1 does.

NT Server's access scheme lets you define a share name for a set of files and directories. You can define shares with various names and access levels and apply them to different individuals and groups. Setting shares and permissions is reasonably easy, though not quite as straightforward as it is with LAN Server 4.0; integrating this functionality into the **User Administrator** would further simplify administration. Microsoft could also better integrate server- and domain-level administration, which, though easy to carry out, resides in four separate places in the interface.

Once we had created accounts, we experienced a surprising amount of trouble connecting to the server from our NT workstation. We got "Could not locate domain controller" messages on some accounts, logged on successfully with another account, and then successfully logged on with the original account. We saw similar behavior with an erroneous message that the log-on service was missing.

As before, NT Server 3.5 includes the capability for administrators to establish trust relations between domain directories. Though it lacks the power of NDS, this capability nonetheless permits users to have a single **user** account with one password across domain directories and, just as important, allows centralized administration of the network. You can set the trust to be mutual or one way. For networks with many domain directories, managing the trust relations themselves is not trivial, but the added power this capability affords administrators is part of what makes this version of NT Server such a compelling product.

Administration: other tasks

LAN Server 4.0 Advanced: Good

Unlike NT Server, which forces you to choose between the faster file allocation table (FAT) and the more secure NT File System (NTFS), LAN Server's High Performance File System (HPFS) gives you the best of both worlds; it's fast and provides fine file and directory security. HPFS runs at the Intel CPU's so-called Ring 0 and attempts to process I/O requests within a single interrupt. HPFS is also necessary in order to perform the full range of administrative tasks, such as protecting files from unauthorized access at the server itself (an important feature because LAN Server runs on top of an operating system without log-on protection).

LAN Server, unlike **NetWare** 4.1, does not implement C2-level security. It does use an encrypted key to authenticate users, though, just as the other two NOSes do.

LAN Server logs system errors and warnings and provides quick help with them. The audit log utility, however, is limited to events on the server. There is no auditing facility, nor does it provide transaction logging or automatic reboot.

LAN Server adds a second meaning to the term "application server." Administrators can define DOS, Windows, or OS/2 applications to LAN Server; users and groups with rights can access applications without having to know their actual locations, allowing administrators to make changes to servers that are transparent to users. You can administer the server from a client workstation, though not a remote workstation.

LAN Server 4.0 does not implement dynamic performance tuning. However, it does come with a utility called **LS 4.0 Tuning Assistant** that gives administrators extensive access to system parameters. Using it requires a lot of LAN Server savvy, though, as well as expert knowledge of networking at a low level.

IBM equips LAN Server with a number of utilities, including LAN Specialist, which helps track errors (client **software** is required), and a file-synchronizing utility for remote users (who must be running OS/2). An action folder called LAN Server Productivity Aids contains some in-house utilities included on the installation CD. They're worth the separate installation required, especially the Access Control Manager, which further simplifies resource sharing.

LAN Server supports only RAID Level 1, though third-party **software** is available to implement other levels. LAN Server offers uninterruptible power supply (UPS) support as well.

NetWare 4.1: Very Good

NetWare 4.1 offers a wealth of features in both the host and client areas that provide fine basic security and allow network managers to decide how they want to balance security against **user** -friendliness. Novell has applied for C2 security certification -- the so-called Department of Defense Red Book standard -- with the National Computer Security Center for the entire network environment -- server and client hardware and **software**.

At the server, you can remove DOS after installing NetWare to deter tampering. Novell provides various options to prevent the use of unauthorized NetWare Loadable Modules. Password encryption, log-in restrictions, and automatic intruder lockout (multiple unsuccessful log-in attempts cause a **user** to be locked out) help prevent unauthorized log-ins. At the client, RSA encryption provides log-in security, and NetWare Core Protocol Packet Signature checking prevents a **user** from assuming unauthorized privileges.

Novell relies on NetWare Directory Service (NDS) access-control rights and inheritance-rights filtering to limit access to objects in the NetWare database. This also allows the administrator to create subgroup administrators who have control over only part of the NDS tree.

A separate auditing function and a utility, AUDITCON, monitor both security and resource usage.

NetWare has long offered a brace of system fault tolerance (SFT) features known as SFT I and II. They include duplication of FATs and directory entries, read-after-write input and output, and disk duplexing and mirroring. Novell's hot-fix feature automatically remaps bad disk blocks. NetWare's transaction tracking system protects database files from corruption by backing out incomplete transactions.

SFT III, which was an add-on to NetWare 3.x, mirrors two servers across a high-speed link. Novell includes SFT III as an option on the installation CD-ROM (but you must still buy a **license**).

Although Novell touts the NDS database as a scalability feature, you can **partition** it and make replicas on other servers. If a server goes down, users on that server can still log in to the network using a replica. In addition, NetWare 4.1 print servers automatically reconnect after going down.

The High Capacity Storage System migrates older files to optical jukeboxes, thus maximizing hard disk space. NetWare 4.1 also provides an integrated system, Storage Management Services (SMS), to back up files

across the network for both servers and workstations. SMS backs up workstation files independent of client operating systems. The NetWare Message Handling Service is now an integral part of the OS and provides enhanced internetwork routing. It comes with a simple E-mail package, First Mail, as well as APIs for industry-standard messaging protocols.

NDS enhances NetWare 4.1's utility as an application server. By defining an object that points to an application, such as a word processor, users can access the application without knowing details about its location. The administrator can move the application to a different directory or file server without affecting users.

Windows NT Server 3.5: Excellent

Although NT Server sports an improved FAT, you must use NTFS to achieve the Defense Department's C2-level security for both Orange Book and Red Book classification (a fact Microsoft should highlight during the installation procedure).

As a transaction-based file system, NTFS helps Version 3.5 achieve a measure of protection against system crashes and power failures; the file system automatically specifies what information to log and then re-creates the state of the machine prior to the crash.

Transaction logging can take a lot of administration and eat up an enormous amount of disk space, so it comes at a price, but for certain client/server applications, it's well worth it. You can set a server to reboot automatically after a crash -- an essential feature for many mission-critical and line-of-business applications.

In addition, like the other NOSes in this comparison, you can administer the server from a 16-bit or 32-bit client workstation, or from a remote workstation, independent of the protocol the client is running.

NT Server self-tunes to optimize performance, but administrators can also use some modest tools to improve performance. The best of these is a performance monitor that keeps an eye on a large number of system goings-on (it reads a dynamic registry rather than hooking the system, so it adds little overhead of its own). You can specify in advance if the server is to act as an application server. You can also specify that the server not participate in domain control.

NT Server's administrative utilities include a disk administrator that helps with partitioning and fault tolerance; an obtuse but informative event viewer; a diagnostics tool that is actually a system information utility; and a backup utility.

NT Server also provides built-in uninterruptible power supply support and offers the most extensive RAID support, for Levels 0,1,2, and 5. In addition, NT Server's client **software** will attempt to reconnect when a connection is lost.

File and print speed: moderate and heavy loads

Once you've determined that a NOS contains all the functional pieces necessary to support your needs, your next step is to learn how fast and reliable the system is. It's difficult, if not impossible, to choose or add a NOS to your existing infrastructure without knowing how the system performs. In prior comparisons, NOS file and print performance varied considerably, often with enormous gaps between products. With these NOSes, the gap has tightened at moderate loads. We still found considerable differences in scalability, however.

MODERATE WORKLOAD

LAN Server 4.0 Advanced: Excellent

LAN Server blazed across the finish line on 20 workstations, leaving behind all the competition, including NetWare 3.12, over which it had an 11 percent lead. No client workstations dropped out.

NetWare 4.1: Very Good

The results here were similar to the results of our heavy workload: NetWare 4.1 ran only 3 percent slower than NetWare 3.12. The system did not drop any clients.

Windows NT Server 3.5: Very Good

NT Server 3.5 acquitted itself well under our moderate workload. The system was 4 percent faster than NetWare 3.12, earning second place.

HEAVY WORKLOAD

LAN Server 4.0: Satisfactory

LAN Server ran our heavy workload 47 percent slower than it ran the moderate load. It handled the 40 workstations fairly well in terms of

speed.

However, like NT Server 3.5, LAN Server dropped a couple of workstations when we moved to the heavier load, indicating engine trouble.

Turning in a time of 27 minutes, 33 seconds for the heavy load, LAN Server was 16 percent slower than NetWare 3.12 (which dropped no clients), but it performed considerably faster than NT Server 3.5.

NetWare 4.1: Very Good

Although Novell may not consider Version 3.12 a competitor to Version 4.1, users should be comforted to know they will experience minimal performance degradation in moving from Version 3.12 to Version 4.1. NetWare 4.1 was only 5 percent slower than NetWare 3.12 at running our application scripts on 40 workstations, and it far outpaced NT Server 3.5 and LAN Server 4.0.

Neither version of NetWare degraded much between 20 and 40 clients (only 14 percent for Version 3.12 and 16 percent for Version 4.1), indicating similarities in the core operating systems. They handled the heavier load far better than LAN Server and NT Server.

Moreover, Version 4.1 earns our "no baby-sitter required" award; it ran our heavy load flawlessly, without dropping any clients.

Windows NT Server 3.5: Satisfactory

Compared to its predecessor, NT Server 3.1, Version 3.5 is a competitive NOS. Version 3.5 runs significantly faster over its new native IPX than Version 3.1 ran over NetBEUI.

Compared to the NOSes here, however, NetWare 3.5 is still a tortoise when the network load climbs. A fine performer under lighter loads, NT Server showed the most dramatic degradation of all the products -- 56 percent -- at 40 workstations.

Moreover, like LAN Server, NT Server typically dropped two client workstations during our multiple runs of the benchmark test.

NetWare integration

LAN Server 4.0 Advanced: Satisfactory

LAN Server does not deliver support for direct NetWare connectivity (that is, it does not ship with an IPX protocol stack). This is partially an architectural issue: LAN Server runs as an application on top of OS/2, for which users can purchase a separate NetWare requester. Although the result is more limited than NT Server's NetWare interconnectivity, users can employ the server-atop-base-OS scheme to roll their own gateways. Running the NetWare requester from the LAN Server machine, for instance, allows you to map directories on the NetWare machine and then set shares to them from LAN Server. Like NT Server's gateway, this is not a high-performance link, so you should use it with some caution. In addition, the connections aren't free.

NetWare 4.1: Excellent

Novell, realizing that NetWare 3.1x systems predominate among current networks, has made it possible for earlier versions of NetWare not only to connect to Version 4.1, but also gain greater functionality in the bargain.

A coupon is included for another tool, DSSTANDARD, which reads Version 3.x bindery information, allows you to manipulate it as if it were a NetWare Directory Services (NDS) database, and writes the resulting data in NDS format.

The product's NetSynch utility lets you cluster as many as 12 NetWare 3.1x systems with a NetWare 4.1 system that manages the NetWare 3.1x users and grants them access to its printing services. If you change a **user**'s account with NWADMIN, the program will automatically propagate those changes to the other systems. This allows a leisurely migration to NetWare 4.1 and simplifies networkwide administration.

Windows NT Server 3.5: Very Good

Version 3.1 of NT Server was conspicuous in its failure to relate well to NetWare servers. Version 3.5 remedies that oversight with a vengeance. IPX now operates as the default stack, and the product now supplies Gateway services for NetWare. In addition, a new NetWare Gateway service provides transparent, protocol-independent access to NetWare files and directories from a client machine via the NT server. Be aware that a toll booth guards this gateway, however.

Although the NT server only needs to have a single account on the NetWare server for the service to work, individuals using the gateway must all possess NetWare licenses, just as they normally would. Performance also

takes a hit; because a single connection can handle only so much traffic, users will achieve faster results accessing the NetWare server directly rather than going through the NT intermediary.

With Version 3.5, Microsoft has made it quite easy to abandon NetWare 3.x altogether by including a utility called Migration Tool for NetWare, which reads bindery information on the NetWare server. It then creates NT versions of the **user** accounts on a second machine, copying over whatever files, directories, and associated permissions you select.

Enterprise capabilities

LAN Server 4.0 Advanced: Good

LAN Server 4.0 now ships with TCP/IP within its Multiprotocol Transport Services package, which helps manage the use of protocol stacks. IBM has rewritten this version of TCP/IP; it performed well in our recent TCP/IP comparison, coming within 1 second of the fastest product in executing File Transfer Protocol (FTP) transfers.

IBM's moniker for the product, TCP/IP over NetBIOS, can be confusing, but it does refer to a native protocol stack and not a NetBIOS-to-TCP/IP translation. (IBM also uses the terms NetBIOS and NetBEUI interchangeably.)

Unlike NT Server, LAN Server does not implement the Dynamic Host Configuration Program (DHCP) specification of the Internet Engineering Task Force; IBM plans to include it in a future release. LAN Server provides Internet-access utilities through the Internet Access Kit that ships with OS/2 Warp 3.0. Alone, the Warp utilities provide only modem connectivity, but LAN Server is actively aware of these utilities and automatically makes them network enabled.

NetWare 4.1: Good

NetWare 4.1 allows multiple protocols -- including IPX, TCP/IP, and AppleTalk -- to run simultaneously on a server. Novell's preferred internetworking protocol is its own IPX, along with NetWare Link Services Protocol (NLSP); for installations that use Internet Protocol (IP) as their base, Novell includes a coupon for IP in 4.1.

NLSP provides internetwork routing functions for the network. One of its biggest advantages is that it dramatically cuts down on the broadcasting of Routing Information Protocol and Service Advertising Protocol, protocols that the system uses to communicate internetwork configuration information.

Version 4.1 introduces some new tools, such as INETCFG, SERVMAN, and TCPCON, among others, that help in network configuration, maintenance, and monitoring.

INETCFG is a one-stop configuration utility that handles boards, protocols, interfaces, and bindings. SERVMAN handles set variables and provides resource-usage information, and TCPCON provides information about TCP/IP connections.

NetWare provides support at both the host and client level for TCP/IP. You can configure client access to use SLIP or Point-to-Point Protocol (PPP).

Two separate products, NetWare Connect and LAN Workgroup, enhance NetWare's connectivity. NetWare Connect allows dial-in and dial-out access to the NetWare network and provides administration tools for remote **user** management. LAN Workgroup, which administrators receive when they redeem their coupon for NetWare IP, gives users at NetWare workstations access to Unix and other IP platforms.

Windows NT Server 3.5: Very Good

In our tests, the speed of NT Server 3.5's out-of-the-box TCP/IP stack rivals that of the fastest product in our Sept. 12 TCP/IP comparison (FTP **Software** Inc.'s PC/TCP 1.3 for OS/2 2.0). The product also boasts a new facility called DHCP, a server that pools and dynamically allocates IP addresses across the enterprise. A facility called Windows Internet Name Service handles the mapping and resolution of NetBIOS host names to the pooled IP addresses.

All in all, the DHCP server was easy to set up, though you'll still need lots of IP savvy. Adding a TCP/IP stack to our client workstation was fast -- the DHCP server handled everything.

NT Server 3.5 Remote Access Server (RAS) now offers transparent dial-in access that makes the remote machine appear to be a network node and allows 256 simultaneous connections. Combined with properly administered trusted domains, RAS provides remote users with a single

log-on irrespective of locale. RAS, which supports SLIP and PPP clients, can use IPX, TCP/IP, NetBEUI, or any other transport for remote NetWare interconnectivity, and it offers the identical authentication security as NT Server. RAS also supports ISDN and x.25.

NT Server comes with FTP, Telnet, and about 15 standard IP utilities, such as finger, lpr, and rexec.

Report Card: Network operating systems

LAN Server 4.0 Advanced

IBM

Austin, Texas

(800) 342-6672; fax: (800) 426-4329

(Weighting) Performance

Installation and client configuration (75) Very Good 56.25 The easy option really is. If you can answer all the questions in the tailored option without resorting to your computer documentation, you automatically qualify for a degree in computer science. Separate installation required for OS/2.

Administration: establishing users (150) Very Good 112.50

Object-oriented administration tools allow quick and easy **user** account creation and resource sharing. Centralized administration and single network log-on are achievable with a bit of extra work. The public-applications feature and enforced disk-space limits are especially strong.

Administration: other tasks (150) Good 93.75 LAN Server's security is weaker than NT Server's or NetWare 4.1's -- OS/2 lacks a log-on capability but it offers file access protection via High Performance File System. You must tune performance manually, but IBM supplies a very complete tool. Basic bundled tools are helpful for administrative tasks. LAN Server does basic event logging.

File and print speed: moderate load (150) Excellent 150.00 At 20 clients, LAN Server posted the fastest time of all the NOSes we tested -- including NetWare 3.12.

File and print speed: heavy load (150) Satisfactory 75.00 Although it didn't suffer quite the hit that NT Server took when moving to 40 clients, LAN Server's performance still degraded 47 percent.

NetWare integration (75) Satisfactory 37.50 LAN Server doesn't ship an IPX stack and doesn't directly address NetWare connectivity; you must use the OS/2 NetWare requester instead. You can use the system's Net Signon product to coordinate a **user** log-on with both NetWare 3.x and 4.x servers, as well as LAN Server servers.

Enterprise capabilities (75) Good 46.87 LAN Server's rewritten TCP/IP is faster and is now a part of its Multiple Protocol Transport Services, which makes managing it easier. OS/2 Warp 3.0 comes with a strong suite of stand-alone Internet-access applications, which LAN Server can leverage to provide Internet capabilities to networked clients.

Support and pricing

Documentation (50) Good 31.25 Documentation is provided both in hard copy and on-line (on the installation CD). It is easy to use and reasonably complete. You can view on-line manuals from both Windows and OS/2 clients. On-line help, however, is too often more didactic than tutorial.

Support (75) Excellent 75.00 IBM is the only vendor here that provides any free telephone support (on a toll-free line to boot). The vendor also offers a wide variety of paid-support options.

Price (50) Good 31.25 LAN Server lists for \$2,295 per server and \$45 per **user license**. Based on IBM's estimated retail discount of 40 percent, our one-server, 100-**user** network is \$4,077. Our calls put the price at about \$700 to \$1,000 higher.

Final Score 7.0

NetWare 4.1

Novell Inc.

Provo, Utah

(800) NETWARE, (801) 429-7000

Installation and client configuration (75) Good 46.87 CD-ROM and reasonable defaults make installation easier than ever. But you still have to know your I/O addresses and IRQs to get through the process. You must specify disk and network interface card drivers. Client installation is a snap.

Administration: establishing users (150) Excellent 150.00
Administration tools are so intuitive and comprehensive, you won't think it's NetWare -- until you look at the console. NetWare Directory Services' (NDS) edit and merge limitations are gone. You can configure a single network log-on. Consolidated network configuration.

Administration: other tasks (150) Very Good 112.50 Provides C2-level security and independent auditing function to monitor usage and security. Performance tuning is dynamic. NDS replicas allow log-ons even if main server is down. Transaction tracking and file backup add reliability. SFT III allows duplexing of two separate servers for mission-critical applications.

File and print speed: moderate load (150) Very Good 112.50 NetWare 4.1 handled our moderate load almost as well as NetWare 3.12, but neither could match LAN Server.

File and print speed: heavy load (150) Very Good 112.50 Like NetWare 3.12, Version 4.1 did a superb job of shouldering the heavy LAN load in our 40-client tests. After NetWare 3.12, it degraded the least and had no problems with workstations dropping out.

NetWare integration (75) Excellent 75.00 Novell has done what it takes to make a leisurely migration from 3.1x to 4.1 not only possible but desirable. Stand-alone tools let you read and edit the 3.12 bindery and turn it into a 4.1 NDS database. With the NetSynch tool, 3.12 servers not only connect but can be administered from 4.1.

Enterprise capabilities (75) Good 46.87 IPX, TCP/IP, and AppleTalk can run simultaneously. NetWare Link Services Protocol eases internetwork routing and reduces overhead network traffic. Coupon for IP and LAN Workgroup included in 4.1. New tools help configure, maintain, and monitor networks.

Support and pricing

Documentation (50) Good 31.25 A separate CD (from the installation CD) contains the documentation; printed manuals cost extra. On the bright side, the on-line documentation is faster to search than before and is fairly comprehensive. On-line help is straightforward and useful.

Support (75) Good 46.87 Novell offers some fee-based plans and adequate on-line support, but NetWare users are expected to rely primarily on their dealers and NetWare's huge third-party market of consultants and training centers for help.

Price (50) Very Good 37.50 NetWare 4.1 is too new for us to estimate a street price, but it will be on par with 3.12, according to Novell. List prices range from \$4,995 for 50 users to \$47,995 for 1,000 users. Based on 3.12 street prices, our estimated 100-user street price is \$3,300.

Final Score 7.7

Windows NT Server 3.5

Microsoft Corp.

Redmond, Wash.

(800) 426-9400, (206) 882-8080

Installation and client configuration (75) Excellent 75.00 Couldn't be easier. A new Network Client Administrator provides several ways to install client-requester software.

Administration: establishing users (150) Good 93.75 Main user -account administration tool is functional and fairly simple to use. Resource sharing and domain management are poorly integrated with user administration and somewhat prone to minor errors. Trusted domain directories allow easy centralized administration and a single network log-on -- a major enhancement over the previous version.

Administration: other tasks (150) Excellent 150.00 Provides C2-level security. Dynamic performance tuning requires little input from administrator. NT File System supports transaction logging, as well as a new automatic reboot feature that helps keep client/server applications on-line and aids in troubleshooting.

File and print speed: moderate load (150) Very Good 112.50 NT Server beat our baseline of NetWare 3.12's performance by a modest margin.

File and print speed: heavy load (150) Satisfactory 75.00 Despite its new IPX stack, NT Server's performance degraded 56 percent in going from our moderate to heavy workloads.

NetWare integration (75) Very Good 56.25 Ships with fast IPX stack and provides separate gateway service for clients not running a NetWare

requester.

Enterprise capabilities (75) Very Good 56.25 DHCP for pooled IP addresses. TCP/IP is fast and easy to install, and Remote Access Service is well integrated into the product.

Support and pricing

Documentation (50) Good 31.25 A complete set of documentation comes on the installation CD, but only setup instructions are provided in hard-copy form (you can purchase the rest of the manuals for \$69.95). Documentation is generally comprehensive, with most information easy to locate.

Support (75) Very Good 56.25 Like NetWare, NT Server comes with no free telephone support, but Microsoft offers more support avenues overall than Novell, including a free quick-fix service that diagnoses and fixes problems remotely in real time.

Price (50) Very Good 37.50 Microsoft's estimated street price is \$699 per server and \$569 for a 20-**user license** pack. Upgrades from NetWare and NT Server clients are half price. Total price for our one -server, 100-**user** network: \$3,544.

Final Score 7.4

GUIDE

InfoWorld reviews only finished, production versions of products, never beta-test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting of each criterion by its rating, where:

Excellent = 1.0 - Outstanding in all areas.

Very Good = 0.75 - Meets all essential criteria and offers significant advantages.

Good = 0.625 - Meets essential criteria and includes some special features.

Satisfactory = 0.5 - Meets essential criteria.

Poor = 0.25 - Falls short in essential areas.

Unacceptable or N/A = 0.0 - Fails to meet minimum standards or lacks this feature.

Scores are summed, divided by 100, and rounded down to one decimal place to yield the final score out of a maximum possible score of 10 (plus bonus). Products rated within 0.2 points of one another differ little. Weightings represent average relative importance to InfoWorld readers involved in purchasing and using that product category. You can customize the report card to your company's needs by using your own weightings to calculate the final score.

The Test Center Hot Pick is InfoWorld's new award for outstanding products we have evaluated in scored stand-alone reviews or product comparisons. To receive the Test Center Hot Pick seal, a product has to offer what InfoWorld deems to be a standout feature or technology that is unusually valuable or revolutionary compared to competitors. The product must also score at least satisfactory in all report card categories and receive a final score of 7.0 or more.

Related Article: HOW WE TESTED

Installation

We installed each network operating system from CD-ROM and the necessary client-requester **software** from floppy disks. We awarded a satisfactory score to a largely manual installation process that an administrator could carry out with the aid of reasonably clear written documentation. Products that made the installation faster and easier -- by offering features such as automatic hardware detection, a well-designed interface, or documentation that helped us make informed configuration decisions -- received extra points. We deducted points for inadequate on-line or written documentation, lack of support for common brands of hardware, poorly designed interface elements, or run-time errors attributable to faulty installation.

Related Article: HOW WE TESTED

Administration: establishing users

For this task, we attempted to create **user** accounts that had home directories on the server, log-in script support, and various privilege levels. Products that allowed us to do this in a fairly straightforward manner received a satisfactory score. We awarded extra points if the NOS let us provide users with single networkwide log-in capabilities and gave

administrators the ability to administer the network from a single location.

We also awarded extra points if we could administer and control **user** accounts in a detailed manner and if we could set password policies and restrict the hours of access to the server. Products that let us easily create local and global groups of users, create domains or their equivalent, and replicate and edit groups of users and individual accounts also received bonus points.

Related Article: HOW WE TESTED

Administration: other tasks

A product earned a score of satisfactory if it could implement reasonably robust **user** authentication and file access security; supported some form of data redundancy; could do performance tuning; and could do at least minimal event logging. We awarded extra points for any features that increased the product's capability to restrict access or extended administrative functionality.

Platform for speed tests

To eliminate bottlenecks on our network, we divided our twisted-pair Ethernet network into four segments, each consisting of a rack of 10 clients. Each rack consisted of four Gateway 486/33 PCs with 8MB of RAM; four Hewlett-Packard 86/66 PCs (three of which had 16MB of RAM and one of which had 8MB of RAM); one Dell 386/33 PC with 8MB of RAM; and one Dell 486/25SX PC with 8MB of RAM. We used 3Com 3C509 network interface cards (NICs) for all the clients but the Dells, which used SMC Elite 16 Combo NICs.

Our server was a dual-processor 66-MHz HP NetServer 5/66 LM2 Pentium equipped with 64MB of RAM (see story, page 77). We configured the server's array of five 1-gigabyte drives at RAID Level 5. We used a Cabletron MMAC-M8FNB concentrator as our network hub.

Related Article: HOW WE TESTED

Applications for speed tests

We used four popular DOS applications (WordPerfect 5.1, Harvard Graphics 3.0, Paradox 3.5, and dBaseIV 1.5) and five Windows applications (cc:Mail 1.1, Lotus 1-2-3 1.0, Freelance Graphics 2.0, Excel 3.0, and Word 2.0) running from the server. Using either the native scripting language of the application or MS-Test, a **software** automation tool, each application performed common tasks, including opening, modifying, printing, and saving files. We timed each application for each workstation and averaged the results for all the workstations.

Moderate and heavy workloads

We tested each NOS' speed with three workloads -- single (one client), moderate (20 clients), and heavy (40 clients). We scored only the vendor's implementation of moderate and heavy workloads (see story, page 76).

Moderate load: We calculated how long it took on average for each NOS to complete our benchmark test and compared it to NetWare 3.12's performance.

NOSes that were faster than the NetWare 3.12 baseline earned scores of very good or excellent, depending on the percentage of improvement. (We used 10 percent increments to determine scoring categories.) NOSes slower than our baseline received lower scores.

Heavy load: We calculated scores for heavy workload on both the degree to which a NOS' performance degraded as the network expanded from 20 to 40 clients and its stability -- whether it dropped client workstations as the workload increased.

Related Article: HOW WE TESTED

NetWare integration

To test how well each product can be introduced into an existing NetWare 3.12 environment, we used InfoWorld's own production network as a test bed. We installed each NOS onto a machine and added it to the network (all servers were on the same cable segment). We defined satisfactory as the capability to add the new server to the network without creating additional administrative work, and the capability to allow clients to access files and directories on NetWare servers through the new server. We awarded additional points for the provision of an IPX protocol stack; a NetWare 3.12- to-product migration tool or capability; a product's administrative tools that were capable of managing a NetWare 3.12 server; and any other features that enhanced or extended the interconnectivity of

the product with a NetWare 3.12 server.

Enterprise capabilities

In this task we wanted to see how well each product was suited to wider-area connectivity. We awarded a satisfactory score to products that shipped with a routable protocol stack. We awarded extra points for additional features that enhanced that capability or aided the administrator in carrying out the task. We also awarded bonuses to products that provided Internet access utilities.

Related Article: HOW WE TESTED

Documentation

We looked for a well-laid-out manual that was informative and easy to use. At a minimum, we required that the documentation possess the following: a section that detailed how to set up and configure the server for different environments and that suggested operation and maintenance policies; accurate diagrams; a table of contents; an index; and a specification section.

Price

We scored the estimated retail price of the network operating system plus 100 clients. Microsoft provided us with an estimated price for NT Server 3.5; we based the retail prices for LAN Server 4.0 and NetWare 4.1 on our own research. The three NOSes' prices are similar.

Support

Because support for network operating systems is usually available from a wide variety of sources and the vendors themselves rarely provide free support, we did not test technical support for this comparison by calling the vendor. Instead, we scored the number of avenues of support and the cost. The more ways a **user** can get support and the less it costs, the better the score.

Related Article: HOW WE TESTED

TESTING ADJUSTMENTS:

Capturing print activity

While running LAN Server 4.0 on the heaviest load, we noticed that the print queue continued processing print jobs after the last client had completed the test suite. In order to capture this additional print processing time, we measured the time from when the last workstation completed the suite until the print queue was empty. We then averaged this additional time into each workstation's recorded time.

Related Article: HOW WE TESTED

WORKLOADS EXPLAINED:

Force-feeding NOSes

If you think testing a NOS with only 20 and 40 clients is unrealistic, you're right. Like most testing facilities, however, we don't have hundreds of PCs lying around. We make up for it with scripted benchmark tests that generate a much higher workload than the size of our test LAN suggests. We tune each network segment to push the NOS and CPU to the max with a constant onslaught of file and print requests. The result: a 40-client LAN that approximates several hundred users.

Related Article: In tune: How IBM, Microsoft, and Novell tweaked their NOSes for speed

To see what an expert could do to make these operating systems go faster, we gave IBM, Microsoft, and Novell the opportunity to tune their products for our file and print speed tests. For (unscored) comparison, we ran an untuned and unoptimized implementation of the tests (achieved primarily by using defaults) for all the NOSes except LAN Server. (We couldn't run LAN Server completely unoptimized because of the memory requirement of its DOS requester.)

The number and complexity of changes the vendors chose to make varied. Not all of them improved performance.

NT Server required the fewest and simplest changes. Microsoft changed the striping factor on our disk array from 8KB to 16KB. The company also increased the paging file for virtual memory from 75MB to 150MB during installation. In addition, it optimized client memory by running DOS' MemMaker program. As a result of the latter, Microsoft's implementation of the benchmark ran significantly faster than ours.

Novell tweaked its NetWare 3.12 and 4.1 products similarly. It optimized client memory and the NET.CFG file on each client. On the server side, the company made changes in both the start-up and AUTOEXEC command

files. For example, Novell increased the number of packet-receive buffers and **concurrent** disk writes. Overall, the changes were easy to implement, but they resulted in a difference of less than 4 percent on both our heavy and moderate workloads.

LAN Server required the most changes, though they were fairly simple. IBM required the tailored (vs. the easy) installation in order to disable 24-bit direct memory access. To our surprise, the network interface card (NIC) driver IBM recommended we use for testing (Compaq Netflex II) was not included with the shipping product. After installing the driver from a floppy, IBM made several changes to the NIC parameters, including increasing the number of general requests, queued transmits, and receive buffers. IBM increased the server cache for HPFS386 and decreased the server cache for the file allocation table. As did the other NOS vendors, IBM optimized client memory.

Related Article: HP NetServer is a champ

If we ever need a dual-processor Pentium server again, we'll know where to go. The server for our network benchmark tests, Hewlett-Packard's NetServer 5/66 LM2, is a solid, flexible machine that takes frequent tweaking well.

Our system -- an EISA system that conforms to the symmetric multiprocessing (SMP) specification -- came configured with 64MB of RAM, dual Intel Pentium 66-MHz processors, a CD-ROM drive, and a 5-gigabyte disk array. We requested an additional single-processor CPU board, which we used to conduct our single-processor testing. The server's standard configuration is 16MB of memory, a 256KB write-back cache for each CPU, and 3.5-inch and 5.5-inch floppy drives. (Storage costs extra.)

The disk array we used consisted of five 1-gigabyte hot-swappable drives. The disk array employs an HP i960 EISA SCSI array controller, which supports RAID Levels 0, 1, 5, and 6. We used RAID Level 5 for our testing. In addition to the array, the LM2 provides a single 1-gigabyte drive connected to the internal SCSI controller.

In the course of testing NOSes, we made countless changes to the server's configuration, including changing the CPU board from the dual processor to the single processor and vice versa, changing the network interface cards (NICs), setting up RAID and partitioning the array, and modifying the EISA configuration numerous times. The HP passed these changes with flying colors.

The system was a dream to configure. Changing the CPU board required no tools and, believe it or not, no trips to the EISA configuration. We simply unplugged one board (there are no screws) and plugged in the other. JetSet, HP's menu-driven program for setting up the array, includes extensive help screens. We just booted off the custom JetSet configuration program disk to launch the configuration.

The NetServer's expandability capabilities made the system very flexible, perfect for our testing needs. You can expand memory to as much as 384MB, and processors range from 486DX2-66 to 66-MHz dual Pentiums. It features eight EISA bus-mastering expansion slots and eight front-accessible, half-height drive bays, as well as on-board SCSI and IDE controllers and several disk-array options. The system also incorporates fine security measures, including options for disabling serial and parallel ports, floppy drives, and write operations.

The NetServer 5/66 LM2 has a list price of \$20,478 for the configuration we used in our testing. The standard configuration costs \$8,757.

HP can be reached at (800) 322-4772.

Related Article: Symmetric multiprocessing may not always boost performance

The vendors have designed all the NOSes in this comparison to be scalable to some extent. For NetWare, this means designing the product to provide large numbers of users with file and print services without significantly affecting performance (see benchmark chart, above). Hosting an application with CPU-intensive tasks (as opposed to file and print services) on a NOS, however, calls for another strategy. One such strategy is symmetric multiprocessing (SMP). LAN Server 4.0 supports these via an SMP version of OS/2; NT Server 3.5 supports SMP via a second SMP-aware kernel. Novell is currently at work incorporating SMP capabilities into NetWare.

SMP allows multiple CPUs to share a server's memory, interrupts, and devices through a run-time algorithm. Such a scheme, however, does not automatically translate to improved performance or scalability. For I/O-intensive workloads, the additional overhead of SMP may actually decrease performance, as we found when we ran our file-and-print-intensive benchmark workload on the SMP versions of LAN Server and NT Server using two processors. As the accompanying table shows, multiprocessing proved slower than the uniprocessing environment for all our workloads. Apparently, the overhead of the multiprocessing kernel is significantly greater than that of the uniprocessing kernel, accounting for our single-user test taking longer on multiple CPUs.

It's possible that had we continued to add processors, we would have seen scalability within the multiprocessing kernel itself. It could be, however, that the increased complexity of the SMP environment may simply allow more room for unexpected and unwanted application behavior.

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SPECIAL FEATURES: illustration; table; chart; graph
COMPANY NAMES: International Business Machines Corp.--Products; Novell Inc.--Products; Microsoft Corp.--Products
INDUSTRY CODES/NAMES: CMPT Computers and Office Automation
DESCRIPTORS: Network operating systems--Evaluation
PRODUCT/INDUSTRY NAMES: 7372620 (Networking Software Pkgs)
SIC CODES: 7372 Prepackaged software
TICKER SYMBOLS: MSFT; NOVL; IBM
TRADE NAMES: IBM LAN Server Advanced 4.0 (Network operating system)--Evaluation; NetWare 4.1 (Network operating system)--Evaluation; Microsoft Windows NT Server 3.5 (Network operating system)--Evaluation
OPERATING PLATFORM: Microsoft Windows NT; NetWare; IBM LAN Server
FILE SEGMENT: CD File 275

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737928 VIRTUAL

1244747 MACHINE

S7 771 S1 AND VIRTUAL AND MACHINE

?s s7 and license (w) manager

771 S7

897828 LICENSE

4178522 MANAGER

1043 LICENSE(W)MANAGER

S8 9 S7 AND LICENSE (W) MANAGER

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8/3,AB/1 (Item 1 from file: 15)

DIALOG(R)File 15:ABI/Inform(R)

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01699109 03-50099

Bobbin World software: **From CAD to chargeback control**

Hill, Suzette

Apparel Industry Magazine v59n9 PP: 46-64 Sep 1998 ISSN: 0192-1878

JRNL CODE: ANM

WORD COUNT: 5092

ABSTRACT: The need for connectivity with suppliers and retail stores, as well as Year 2000 budgets, have created a bumper crop of information technology for the apparel industry. **Software** introductions and developments which were recently showcased at the Bobbin World trade show are featured.

8/3,AB/2 (Item 2 from file: 15)

DIALOG(R)File 15:ABI/Inform(R)

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00657165 93-06386

Churning Out the Work

Anonymous

CAE v11n12 PP: 68-80 Dec 1992 ISSN: 0733-3536 JRNL CODE: CAE
WORD COUNT: 10153

ABSTRACT: For engineers involved in design and manufacturing applications, computer price-performance ratio has never been better for PCs, workstations, **multi - user** devices, and peripherals. The growth in client-server computing has spurred some CAD vendors to optimize their **software** to run on networks. The new generation of plotters are fast, precise, and feature innovative and, in many cases, environmentally sound technology. A product listing includes information on the following: 1. PCs, including Intel-based and Macintosh platforms, 2. Unix workstations, 3. **multi - user** computers, such as supercomputers, mainframes, and minicomputers, 4. networking hardware and **software**, 5. accelerator devices, 6. graphics boards, 7. graphics displays, 8. hardcopy devices, including pen and raster plotters, 9. memory devices, 10. supplies used in CAD/CAM installations, and 11. video equipment to link video images with computer graphics.

8/3,AB/3 (Item 1 from file: 275)

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01936432 SUPPLIER NUMBER: 18221495 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Software tools. (1996 Buyer's Guide) (Buyers Guide) (Cover Story)

UNIX Review, v14, n6, p9(52)

June, 1996

DOCUMENT TYPE: Buyers Guide Cover Story ISSN: 0742-3136

LANGUAGE: English RECORD TYPE: Fulltext; Abstract

WORD COUNT: 6562 LINE COUNT: 01874

ABSTRACT: A buyer's guide of Unix-compatible **software** products is presented. Product categories include 3GL compilers, source-code tools, graphical interface **software**, libraries, database tools, system administration programs, security tools, e-mail tools and other utilities. Supported platforms are listed.

8/3,AB/4 (Item 2 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01853941 SUPPLIER NUMBER: 17507761 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Network management. (LAN Buyers Guide Issue) (Buyers Guide)

LAN Magazine, v10, n10, p201(51)

Oct 15, 1995

DOCUMENT TYPE: Buyers Guide ISSN: 1069-5621 LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 48741 LINE COUNT: 04035

ABSTRACT: Network management products are described in the following categories: cable-testing equipment, help desk, inventory and asset management, network management applications, network management platforms, probes and monitors, protocol analyzers, security, server management, server room/wiring closet accessories, storage management **software**, tape drives, training, and troubleshooting tools. The entry for each product includes its name, a brief description, and its price.

8/3,AB/5 (Item 3 from file: 275)

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01848929 SUPPLIER NUMBER: 17156174 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Software **tools**. (Special Issue: **Buyer's Guide**) (**Directory**)
UNIX Review, v13, n6, p9(43)
May 15, 1995
DOCUMENT TYPE: Directory ISSN: 0742-3136 LANGUAGE: English
RECORD TYPE: Fulltext; Abstract
WORD COUNT: 18312 LINE COUNT: 01522

ABSTRACT: A directory of **software** products and vendors for database, development, electronic mail, GUI, source-code management, system administration and security tools is presented. Among the product categories covered are standard third-generation language compilers for Ada, BASIC, C, C++, COBOL, Fortran, Pascal and AI languages; debuggers, run-time error-checkers, and code analyzers; text editors; make utilities, product life-cycle management and CASE tools; GUI interface builders, libraries and cross-platform tools; window managers; code libraries for networking and scientific functions; 4GL database tools; relational databases; and system-management utilities including backup, security and hierarchical storage management. Each listing includes the vendor name, product name and platforms supported.

8/3,AB/6 (Item 4 from file: 275)
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01767470 SUPPLIER NUMBER: 15973257 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Software **utilities**. (**Buyers Guide**)
Microsoft Systems Journal, v10, n1, pS62(5)
Jan, 1995
DOCUMENT TYPE: Buyers Guide ISSN: 0889-9932 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4534 LINE COUNT: 00388

ABSTRACT: A buyer's guide of 69 **software** utilities covering a range of capabilities is presented. Provided information includes company name, phone number, product name, price and a brief product description. Examples include JP **Software** Inc's \$69 4DOS 5.0, a shell that replaces the DOS command processor and adds power to users' commands. Gazelle Systems Inc's \$79 Back-It for Windows 2.0 is a high-level backup utility that provides automatic, **multi** -volume background backups to or from any DOS device or tape drive. It also provides data compression rates of up to 75%. Executive **Software** Inc's File Alert for Windows NT automatically detects file corruption from power surges, power failures, worn-out hard disks, **software** defects and other sources. The package is priced at \$99 per workstation.

8/3,AB/7 (Item 5 from file: 275)
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01556510 SUPPLIER NUMBER: 14403541 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Churning out the work. (**computer hardware and peripherals**) (**Buyers Guide**)
Computer-Aided Engineering, v11, n12, p68(13)
Dec, 1992
DOCUMENT TYPE: Buyers Guide ISSN: 0733-3536 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 12186 LINE COUNT: 01069

ABSTRACT: Competition intensified in 1992 as computer vendors struggled to outdo each other in price and product performance. For engineers and manufacturers who depend on computer-aided design programs, it was a boom time to shop as an array of enhanced hardware with different platforms became available at lower prices. These included microcomputers, workstations, multiprocessors, and client/server networks. Product

introductions also raised the competition such that a 80486DX system that was priced below \$5,000 in Jan 1992 cost less than \$2,200 nine months later. The market for hardcopy devices and graphics peripherals also heated up as raster plotters became popular and innovative, environmentally-friendly plotters were developed. Meanwhile, graphics boards for microcomputers was not spared in the price wars due to the standardization of MS Windows and AutoCAD as platforms.

8/3,AB/8 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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10481086 SUPPLIER NUMBER: 21160548 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Bobbin World software: **from CAD to chargeback control.**
Hill, Suzette
Apparel Industry Magazine, v59, n9, p46(10)
Sept, 1998
ISSN: 0192-1878 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 10448 LINE COUNT: 00878

8/3,AB/9 (Item 2 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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06223643 SUPPLIER NUMBER: 14403541 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Churning out the work. (computer hardware and peripherals) (Buyers Guide)
Computer-Aided Engineering, v11, n12, p68(13)
Dec, 1992
DOCUMENT TYPE: Buyers Guide ISSN: 0733-3536 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 12186 LINE COUNT: 01069

ABSTRACT: Competition intensified in 1992 as computer vendors struggled to outdo each other in price and product performance. For engineers and manufacturers who depend on computer-aided design programs, it was a boom time to shop as an array of enhanced hardware with different platforms became available at lower prices. These included microcomputers, workstations, multiprocessors, and client/server networks. Product introductions also raised the competition such that a 80486DX system that was priced below \$5,000 in Jan 1992 cost less than \$2,200 nine months later. The market for hardcopy devices and graphics peripherals also heated up as raster plotters became popular and innovative, environmentally-friendly plotters were developed. Meanwhile, graphics boards for microcomputers was not spared in the price wars due to the standardization of MS Windows and AutoCAD as platforms.
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1244747 MACHINE
4178522 MANAGER
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9/3,AB/1 (Item 1 from file: 15)
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01574380 02-25369
Darwin workstations, Ultra 60 workstation, Elite3D Graphics

Beckert, Beverly
Computer-aided Engineering v17n2 PP: 24-28 Feb 1998 ISSN: 0733-3536
JRNL CODE: CAE
WORD COUNT: 1508

ABSTRACT: Sun Microsystems Computer Corp. announced several enhancements to its product family in January. It introduced the entry-level Ultra 5 and Ultra 10 workstations, part of the new Darwin line. In the middle to high-end range, it added the Ultra 60 system. On the graphics front, Sun unveiled its new high-performance Elite3D boards. The Ultra 5 workstation is geared to professionals in electronic design automation, digital content creation, **software** development, and database use. For users in mechanical CAD, simulation, EDA, **software** development, and digital content creation, the Ultra 10 is the platform of choice. The Ultra 60 workstation comes with one or two 296-MHz UltraSPARC II processors.

9/3,AB/2 (Item 2 from file: 15)
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01094437 97-43831

No need to adjust your set

Dornbusch, Margaret; Mace, Scott; Sercan, Ayse
InfoWorld v17n37 PP: 60-78 Sep 11, 1995 ISSN: 0199-6649 JRNL CODE: IFW
WORD COUNT: 8068

ABSTRACT: Three desktop management **software** packages are reviewed. They are: 1. Intel Corp.'s LANdesk Management Suite 2.01, 2. Norton Administrator for Networks 2.0 from Symantec Corp., and 3. Microsoft Corp.'s Systems Management Server 1.0. Norton Administrator is the leader of the comparison. It is the only product that is not tied to a particular operating environment, giving it the capability to function in any environment. It offers outstanding client-side application metering and workstation inventory. LANdesk Management Suite provides the best overall problem-solving environment. Microsoft SMS is the most difficult to set up and configure.

9/3,AB/3 (Item 3 from file: 15)
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00867915 95-17307

Making connections

Rash, Wayne Jr; Marcus, Ann M
InfoWorld v16n22 PP: 68-89 May 30, 1994 ISSN: 0199-6649 JRNL CODE: IFW
WORD COUNT: 13857

ABSTRACT: Seven Windows communications packages are evaluated: 1. Crosstalk for Windows 2.1.0 from Digital Communications Associates Inc., 2. DynaComm 3.11 from FutureSoft Engineering Inc., 3. HyperAccess for Windows 1.02 from Hilgraeve Inc., 4. ProComm Plus for Windows 1.02 from DataStorm Technologies Inc., 5. QmodemPro for Windows 1.0 from Mustang **Software** Inc., 6. Relay/PC Gold for Windows 6.0 from Relay Technology Inc., and 7. WinComm Pro 1.0 from Delrina Technology Inc. Relay Technology's Relay/PC Gold gave an outstanding performance. The product can operate simultaneously across a wide variety of environments. Hilgraeve's HyperAccess and Delrina's WinComm Pro are essentially the same product; both offer a clever interface design, exceptional ease of use, and powerful expansion capabilities.

9/3,AB/4 (Item 4 from file: 15)

DIALOG(R) File 15:ABI/Inform(R)
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00765422 94-14814

Tireless testers

Quinn, Stephen R; Ware, John C

InfoWorld v15n36 PP: 72-84 Sep 6, 1993 ISSN: 0199-6649 JRNL CODE: IFW
WORD COUNT: 10849

ABSTRACT: The capabilities of 3 automated software test tools are compared: 1. Microsoft Corp.'s Microsoft Test, Version 2.0, 2. Segue Software Inc.'s QA Partner, Version 1.0, and 3. Software Quality Automation Inc.'s SQA TeamTest, Version 2.2. QA Partner scored the highest, setting itself apart from Microsoft Test and SQA TeamTest by offering cross-platform capabilities. Microsoft Test, with its Visual Basic-like TestBasic scripting language, draws much of its power from the Smart Events included in the Dynamic Link Libraries that ship with the program. SQA TeamTest provides an integrated testing environment, adding a Test Repository that lets users log and track test results.

9/3,AB/5 (Item 5 from file: 15)

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00614132 92-29235

Moving C from DOS to UNIX Going from UNIX to DOS

Dichter, Carl; Binstock, Andrew

UNIX Review v10n6 PP: 29-38 Jun 1992 ISSN: 0742-3136 JRNL CODE: UXR
WORD COUNT: 3413

ABSTRACT: Steps involved in performing a port from DOS to UNIX include: 1. Scope the project. 2. Determine the extent of the differences. 3. Plan the changes required. 4. Move the files. 5. Get the data converted. 6. Get the programs to compile. 7. Test the programs and create regression test suites. 8. Optionally perform optimizations, and test again. 9. Make documentation changes. 10. Make marketing plans and materials. Once on UNIX, with its rich toolset, multiprocessing, and symmetrical access to memory, users can take advantage of these features. This may result in programs that are faster, smaller, and easier to internationalize. However, because DOS is a single-user, single-tasking system, a port from UNIX will not only encounter architectural differences, but will require a different mind-set. DOS' most famous limitation is its inability to access more than 640KB of RAM. To solve this problem, DOS extenders have been developed that allow applications to access a linear 32-bit address space and still call DOS services.

9/3,AB/6 (Item 1 from file: 9)

DIALOG(R) File 9:Business & Industry(R)
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03193972

Compute farms: the new data centers

(An overview of compute farm trend, which is a collection of independent computing nodes, storage arrays, networking components, and software that appears to end users as one computing resource)

EDN, v 46, n 16, p 54

July 19, 2001

DOCUMENT TYPE: Journal; Industry Overview ISSN: 0012-7515 (United States)

LANGUAGE: English RECORD TYPE: Fulltext

WORD COUNT: 3111

TEXT:

By Gabe Moretti, Technical Editor

Today's CPUs are not powerful enough to support the development of their successors. Dynamically allocated computing power keeps projects on time and fosters quality.

Increasing design sizes demand not only better EDA tools, but also significantly higher computing capacity. Physical-synthesis, place-and-route, and especially design-verification applications require so much computing power that they are often bottlenecks in product development. In the last 20 years, the industry has grown accustomed to depending on personal workstations, and engineers have used them to perform the functions required for the design and development of products. For much of this period, engineers have been artisans, using personal tools in the advancement of their craft. When designers worked alone on a project, it was easier for managers to predict the required hardware and software configuration for each desktop. Now, engineers work on various tasks with differing degrees of complexity and use a number of EDA tools. It is therefore impractical to dedicate a specific hardware configuration and particular EDA-tools licenses to individual engineers. The CPU usage in a workstation typically ranges from 5 to 20%. Most of the time, a workstation is performing I/O operations or is idle waiting for data. As a design grows, it becomes necessary to collaborate with co-workers to conquer the complexity, as does borrowing computing power from the network to finish the job in time. Companies have a difficult task procuring and managing the correct mix of workstations, because it is hard to predict the amount of computing power that each designer will require over the life of the equipment.

9/3,AB/7 (Item 1 from file: 275)

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02545913 SUPPLIER NUMBER: 79131112 (USE FORMAT 7 OR 9 FOR FULL TEXT)
VERSION CONTROL, WITH INTEGRITY -- MKS' Source Integrity VCS stands out for its comprehensive platform support, ease of management and strong security, but we'd like a license to kill ... its license.(Software Review) (Evaluation)

Macvittie, Lori
Network Computing, 69
Oct 15, 2001

DOCUMENT TYPE: Evaluation ISSN: 1046-4468 LANGUAGE: English
RECORD TYPE: Fulltext
WORD COUNT: 4290 LINE COUNT: 00337

9/3,AB/8 (Item 2 from file: 275)

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02322602 SUPPLIER NUMBER: 55449861 (USE FORMAT 7 OR 9 FOR FULL TEXT)
VA LINUX SYSTEMS' VARSERVER S3500E.(Software Review) (Evaluation)

Foster-Johnson, Eric
UNIX Review's Performance Computing, 17, 10, 37
Sept, 1999

DOCUMENT TYPE: Evaluation LANGUAGE: English RECORD TYPE: Fulltext
; Abstract
WORD COUNT: 5137 LINE COUNT: 00396

ABSTRACT: VA Linux Systems' VARserver S3500E is a powerful enterprise server that runs Red Hat Linux on multiple Pentium III Xeon processors and targets the high-end business market rather than home hobbyists. A configuration with four 500MHz PIII chips and a six-drive RAID array costs \$18,445; prices start at \$13,995 for a similar CPU configuration with 1GB of RAM and one 9GB hard disk. The machine's physical design is that of a workhorse server, with security locks on the disk drives and outstanding expandability. Users can add up to 4GB of ECC memory, four Ethernet

interfaces and three power supplies. The tested machine had four 450MHz Pentium II Xeon chips, whereas newer models run Pentium IIIs; performance is nevertheless excellent on standard SPEC benchmarks. Operation is very stable, and the system runs well-proven FTP and Web-server tools, including Apache. The VArserver earns an overall rating of excellent.

9/3,AB/9 (Item 3 from file: 275)

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01944259 SUPPLIER NUMBER: 18315423 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Database servers and host DBMSs. (1996 Database Buyer's Guide and

Client/Server Sourcebook) (Buyers Guide)

DBMS, v9, n6, p49(5)

June 15, 1996

DOCUMENT TYPE: Buyers Guide ISSN: 1041-5173 LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 5960 LINE COUNT: 00519

ABSTRACT: A buyer's guide of 44 host DBMSs and database servers is presented. Information presented includes a brief description of each product, pricing information, operating system and other software requirements, each vendor's location, and a telephone number and World Wide Web address, when available, for each vendor. Products discussed include relational DBMS packages, a scalable client/server DBMS that lets PC database users move existing .dbf databases and applications to a client/server environment, a database server for LANs and a tool for the Illustra object-relational DBMS that controls time-series and temporal data.

9/3,AB/10 (Item 4 from file: 275)

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01871547 SUPPLIER NUMBER: 17488513 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Digital tools for collaborative engineering. (Special CAD/CAM supplement)

Potter, Caren D.

Computer Graphics World, v18, n8, pS1(7)

August, 1995

ISSN: 0271-4159 LANGUAGE: English RECORD TYPE: Fulltext; Abstract

WORD COUNT: 3515 LINE COUNT: 00285

ABSTRACT: Technology that facilitates human interaction is now available for **concurrent** engineering and offers the potential for shorter design cycles. The multimedia approach to collaborative engineering has been limited to larger companies because these tools require an extensive communications infrastructure. There are three types of tools employed for **virtual** design review. Document conferencing, also known as CAD conferencing and whiteboard conferencing, is the most widely employed of the three. This approach enables people in separate locations to simultaneously view a CAD model. Application conferencing is similar, but participants see the model within the application, not on a whiteboard. Videoconferencing provides PC-based video capture and transmission tools, but the technology is not widely employed at this point because network protocols are not fast enough to synchronize audio and video.

9/3,AB/11 (Item 5 from file: 275)

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01840007 SUPPLIER NUMBER: 17339062 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Design software. (industry news) (Product Announcement)

Dorsch, Jeff

Electronic News (1991), v41, n2068, p44(2)

June 5, 1995

DOCUMENT TYPE: Product Announcement ISSN: 1061-6624 LANGUAGE:
English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1852 LINE COUNT: 00162

ABSTRACT: Major design automation **software** industry news includes an AT&T Design Automation organizational change, Chronologic Simulation's lawsuit against Viewlogic Systems and merger offer from Synopsys, Savantage's new SavantSys CAE tool and Quad Design Technology's new Quiet 2.0 electromagnetic interference (EMI) analysis tool. AT&T Design Automation is being moved from AT&T Microelectronics to AT&T Bell Laboratories where it will be one of the Lab's six functional 'centers.' Chronologic Simulation brought a lawsuit against Viewlogic Systems, which purchased the company in Mar 1995 over a competing offer from Synopsys. Chronologic asserts that Viewlogic did not disclose its true financial condition and is not allowing Chronologic the promised degree of autonomy. SavantSys enables electronic system designers to analyze and optimize circuit partitioning and packaging choices. Quiet 2.0 can simulate a variety of complex 3D EMI effects and resonance problems in systems.

9/3,AB/12 (Item 6 from file: 275)

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01828371 SUPPLIER NUMBER: 15936063 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Engineering software tools meet demands. (includes related article)
Van Tyle, Sherrie
Electronic Design, v42, n13, p71(6)
June 27, 1994
ISSN: 0013-4872 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 3632 LINE COUNT: 00313

ABSTRACT: Developers are producing advanced integrated tool environments that simplify computer-aided systems engineering. Integrated development environments reduce the time required by designers to synthesize their tools. Such environments constitute a complete operating system, which is usually comprised of a compiler, real-time kernel, debugger, network **manager**, language-interface libraries and a file management executive. Although small-company designers hesitate to invest in a tool environment, which entails royalties for each system sold and instead build their own operating systems and applications, they eventually turn to integrated tool environments due to time-to-market pressure. Designers have the formidable task of choosing what will work for their applications from among several development environments already in the market.

9/3,AB/13 (Item 7 from file: 275)

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01812098 SUPPLIER NUMBER: 17223344 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Nexpo '95 preview: eyes on the Net. (vendors and their products)
Rossello, Rosanne
Seybold Report on Publishing Systems, v24, n19, p30(15)
June 12, 1995
ISSN: 0736-7260 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 13083 LINE COUNT: 01131

9/3,AB/14 (Item 8 from file: 275)

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01805565 SUPPLIER NUMBER: 16280777 (USE FORMAT 7 OR 9 FOR FULL TEXT)
IFRA '94 recap: Europe adopts Windows, new systems abound, retrieving images. (includes related articles on Partner von dem Druck's innovative

drum scanner and an acknowledgment to Apple for the use of its QuickTake digital camera)

Joner, Urban; Karsh, Arlene E.; Neeff, David; Tribute, Andrew
Seybold Report on Publishing Systems, v24, n5, p3(55)
Nov 17, 1994

ISSN: 0736-7260 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 44978 LINE COUNT: 03568

9/3,AB/15 (Item 9 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)
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01804827 SUPPLIER NUMBER: 17155740 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Tools and utilities. (1995 Database Buyer's Guide and client/server sourcebook) (Buyers Guide)

DBMS, v8, n6, p72(29)

May 15, 1995

DOCUMENT TYPE: Buyers Guide ISSN: 1041-5173 LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 45154 LINE COUNT: 03869

ABSTRACT: A buyers guide offers information on development tools and utility applications. The tools are employed in every aspect of application development, from prototyping to querying and reporting. The guide is organized alphabetically according to category. The categories include 3GL tools, analysis, documentation and testing tools, application generators and screen painters, CASE, database design and modeling tools, data conversion and transfer applications, DBA and systems administration tools, disk/file utilities, engine/file management subsystems, graphics applications, help systems, class libraries, printing and publishing tools, query tools, report writers and a variety of utilities. The guide includes vendor information and a brief description of each product. The listings were developed through a reader survey requesting detailed product descriptions, platform information and prices. Some prices are not provided because they vary according to operating systems used, hardware platforms, upgrade considerations, site licensing agreements and promotional discounts.

9/3,AB/16 (Item 10 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)
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01710763 SUPPLIER NUMBER: 16222199 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Image-manipulation software. (Seybold Special Report: Seybold San Francisco '94, part 2) (Product Announcement)

Seybold Report on Publishing Systems, v24, n3, pT39(15)

Oct 26, 1994

DOCUMENT TYPE: Product Announcement ISSN: 0736-7260 LANGUAGE:

ENGLISH RECORD TYPE: FULLTEXT

WORD COUNT: 15787 LINE COUNT: 01221

9/3,AB/17 (Item 11 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)
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01688545 SUPPLIER NUMBER: 15356060 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Tools and utilities. (1994 Database Buyer's Guide and Client/Server Sourcebook) (Buyers Guide)

DBMS, v7, n6, p63(29)

June 15, 1994

DOCUMENT TYPE: Buyers Guide ISSN: 1041-5173 LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 46074 LINE COUNT: 03903

ABSTRACT: A thorough listing and description of **software** tools and utility programs for DBMSs is presented. These products are categorized by function, with 3GL, analysis, application generators, CASE tools, file managers, libraries, help systems, query, printing and report writing tools represented. Products range from such well-known offerings as Oracle Corp's Oracle Dictionary, which provides a consistent interface to shared rule in Oracle environments, to obscure products like Rettig Micro Corp's Tom Rettig's Office suite of application development tools for FoxPro.

9/3,AB/18 (Item 12 from file: 275)
DIALOG(R) File 275:Gale Group Computer DB(TM)
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01633347 SUPPLIER NUMBER: 15019112 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Technical tools. (for computer-aided engineering) (Buyers Guide)
Computer-Aided Engineering, v12, n12, p56(6)
Dec, 1993
DOCUMENT TYPE: Buyers Guide ISSN: 0733-3536 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 7829 LINE COUNT: 00710

ABSTRACT: A buyer's guide of technical **software** tools for computer-aided engineering (CAD) tasks, ranging in price from \$25 to \$300,000, is provided. Information includes product name, a brief description, price, platform and vendor phone and fax numbers. Products include 27 database and product data management packages that cover general database management and management specific to engineering needs and 48 drawing and document management packages that provide file tracking, raster-to-vector editing, file viewing and other features. Other products listed include 20 data translators, nine viewing **software** packages, 10 general-purpose two-dimensional drafting packages, six project management packages for large engineering projects, 14 rendering and animation packages, 23 program development **software** packages and seven **software** products for processing technical documentation and illustrations.

9/3,AB/19 (Item 13 from file: 275)
DIALOG(R) File 275:Gale Group Computer DB(TM)
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01582847 SUPPLIER NUMBER: 13357020 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Hardware. (1993 edition) (Buyers Guide)
Wall Street & Technology, v10, n5, p14(9)
Jan, 1993
DOCUMENT TYPE: Buyers Guide ISSN: 1060-989X LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 9141 LINE COUNT: 00817

ABSTRACT: Computer hardware appropriate for Wall Street professionals is listed. Company names, addresses and telephone numbers are indicated for the following product categories: microcomputers; portable, laptop and notebook computers; workstations; local-area network (LAN) management systems; LAN connectors; network controllers; fault tolerant computer systems; mainframe computers; minicomputers; daisywheel printers; dot matrix printers; ion deposition printers; laser printers; CD-ROM drives; hard disk and tape backup systems; optical disk technology; diskettes; connectors; magnetic tapes; hardware maintenance services; data communications equipment; FM systems and devices; modems; telecommunication systems; VSAT; voice data systems; voice response systems; automatic dialers; data security equipment; boards; facsimile systems; monitors; network management systems; optical scanners; and power control equipment.

9/3,AB/20 (Item 14 from file: 275)
DIALOG(R) File 275:Gale Group Computer DB(TM)
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01525862 SUPPLIER NUMBER: 12240966 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Multimedia moves from the drawing board to tangible products.
Nass, Richard
Electronic Design, v40, n10, p56(9)
May 14, 1992
ISSN: 0013-4872 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 5631 LINE COUNT: 00437

ABSTRACT: Multimedia is fast becoming a reality. Advancements in digital signal processing (DSP) have brought many multimedia products to market and are likely to be the driving force behind the future industry. DSP concepts have solved many hardware and **software** problems that were previously insurmountable. New DSP techniques have led to more standardization in multimedia products and features. Designers see multimedia as two separate categories: video and audio. As the technology becomes more mature, competing hardware and **software** vendors are aligning in an effort to market their own multimedia technologies in the hope that they will become de facto industry standards, such as Microsoft Corp.'s Multimedia PC. Detailed is an analysis of the industry and of competing standards.

9/3,AB/21 (Item 15 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01516556 SUPPLIER NUMBER: 12180072 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Moving C from DOS to UNIX: a successful port requires thoughtful design, careful implementation, and a lot of work. (includes a related article on moving from UNIX to DOS) (Tutorial)
Dichter, Carl
UNIX Review, v10, n6, p29(6)
June, 1992
DOCUMENT TYPE: Tutorial ISSN: 0742-3136 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 3617 LINE COUNT: 00277

ABSTRACT: The process of porting a **software** package from DOS to UNIX is described, beginning with a discussion of the differences between DOS and UNIX. The port begins by determining the scope of the project, finding the extent of the differences, planning the required changes, moving the files across, converting the data, compiling the programs, testing the programs and creating regression test suites, performing optimizations and retesting (optional), making documentation changes, and developing marketing plans and materials. A primary difference between UNIX and most other operating systems, including DOS, is that wildcard expansion, or globbing, is done in the shell for most programs; a difference in command-line processing is that options in UNIX begin with a dash, whereas in DOS they begin with a slash. Differences in file names, graphics and screen management, and other aspects of the porting process are described.

9/3,AB/22 (Item 16 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01508906 SUPPLIER NUMBER: 12043096 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Color systems and software. (Seybold and Imprinta, Part II: The Maturing of Midrange Color)
Seybold Report on Publishing Systems, v21, n13, p6(26)
March 30, 1992
ISSN: 0736-7260 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 20583 LINE COUNT: 01602

9/3,AB/23 (Item 17 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)

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01444854 SUPPLIER NUMBER: 11142851 (USE FORMAT 7 OR 9 FOR FULL TEXT)
X Windows terminals designers search for a single-processor solution.
Wilson, Dave
Computer Design, v30, n11, p77(6)
August, 1991
ISSN: 0010-4566 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4134 LINE COUNT: 00320

ABSTRACT: X Windows terminals promise workstation graphics at terminal prices, but the devices require a local microprocessor, LAN controllers, memory controllers and video digital-to-analog converters. X Windows terminals currently cost between \$1,500 and \$5,000, but volume production is not expected until unit prices fall below \$1,000. The devices look alike on the outside, but they use very different designs. The decision as to which devices become the choice of X Windows terminal designers may be based more on company politics than on how effectively the hardware architectures can be optimized to run X Windows **software**. X Windows terminals are comprised of a CPU, a graphics processor subsystem, a network controller, nonvolatile memory and a peripheral controller. X Windows terminals are described from Hewlett-Packard Co, Samsung, Network Computing Devices, Tektronix and Northwest Digital Systems.

9/3,AB/24 (Item 18 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01321029 SUPPLIER NUMBER: 08550029 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Data Based Advisor COMDEX sneak preview. (COMDEX '89; includes related article on Microrim Inc.'s next-generation database management system)
Data Based Advisor, v7, n11, p71(33)
Nov, 1989
ISSN: 0740-5200 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 24226 LINE COUNT: 02038

ABSTRACT: COMDEX '89 is to be the site for various product announcements and demonstrations in the database arena. Many of those are featured in this special section, which gives brief descriptions of many new and enhanced database products to be previewed at COMDEX. Some of those products included in this sneak preview are Communications Horizons' Little RaSQL library, CounterPoint Systems' CounterPoint retail point-of-sale application and Form Generation **Software** 's FORMalware forms function library.

9/3,AB/25 (Item 19 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01320538 SUPPLIER NUMBER: 07931076 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Software. (1990 Buyer's Guide Issue) (buyers guide)
Wall Street Computer Review, v7, n2, p27(95)
Nov, 1989
DOCUMENT TYPE: buyers guide ISSN: 0738-4343 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 56121 LINE COUNT: 04923

ABSTRACT: Product listings are given for the following types of **software**: administrative operating systems, analytical, artificial intelligence/expert systems, asset allocation, asset backed securities, back-office systems and **software**, bond swap, bond trading, cash management, client management for brokers, communications, computer aided **software** engineering, corporate finance, database management, decision support and project management, equities analysis, fixed income analysis, foreign exchange, graphics, insurance, investment analysis,

micro-to-mainframe links, mortgage backed securities pricing, mutual fund pricing, options and futures, payroll, portfolio accounting, portfolio performance evaluation, portfolio management for brokers, portfolio management for money managers, program trading, prospecting for brokers, real estate investment analysis, sales support, spreadsheets, statistical analysis, stock screening, stock transfer and clearing services, tax planning, calculation and preparation, technical analysis/charting, trust and real estate administration, utilities, windowing, word processing, and miscellaneous others.

9/3,AB/26 (Item 20 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01308958 SUPPLIER NUMBER: 07601004 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Power programming. (part 1 of a series on programming Intel's 80386)

Duncan, Ray

PC Magazine, v8, n16, p353(5)

Sept 26, 1989

ISSN: 0888-8507

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 3921 LINE COUNT: 00301

ABSTRACT: Programmers are understandably excited about Intel's new 80386 microprocessor. The 80386 is not just faster than the 80286, it has enormous **virtual** -memory address space, flexible on-chip memory management and pipelined execution; its instruction set is more powerful, regular and efficient than the 80286 and the 8086; and it offers complete backward compatibility with the 8086, 8088 and the 80286. While running in 32-bit protected mode, the 80386 is utterly different than either the 8086 or 80286 running in the same mode. Control programs, alternative operating systems and DOS extenders are currently available to help the programmer put the 80386 to work.

9/3,AB/27 (Item 21 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01301295 SUPPLIER NUMBER: 07424540 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Minifinders. (capsule guide to software packages for the Macintosh)

(buyers guide)

MacUser, v5, n8, p219(14)

August, 1989

DOCUMENT TYPE: buyers guide

ISSN: 0884-0997

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT

WORD COUNT: 21395 LINE COUNT: 01731

9/3,AB/28 (Item 22 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01295742 SUPPLIER NUMBER: 07233578 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Minifinders.

MacUser, v5, n6, p257(1)

June, 1989

ISSN: 0884-0997

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT

WORD COUNT: 18848 LINE COUNT: 01529

9/3,AB/29 (Item 23 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01293117 SUPPLIER NUMBER: 07088640 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Two worlds under one Sun. (Hardware Review) (Sun Microsystems Inc's Sun

386i workstation) (includes related articles on vital statistics of the 386i and company history) (evaluation)

Moyer, Alan; Quirk, Kent

PC Tech Journal, v7, n3, p96(11)

March, 1989

DOCUMENT TYPE: evaluation ISSN: 0738-0194

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 6896 LINE COUNT: 00527

ABSTRACT: Sun Microsystems Inc's Sun 386i workstations unite Unix and DOS on one platform. There are two models, the 150 with a 20MHz 80386 Intel processor for a base price of \$7,490 and the 250 with a 25MHz 80386 processor for a base price of \$11,045. The Sun 386i gives Unix developers a powerful, authentic Unix implementation and the vast number of DOS products as potential tools. The Sun 386i gives DOS developers a good platform for a variety of projects and the advantages of the Unix development environment. Users can run DOS and Unix programs from either environment. Setting up and using the 386i is easy. Testing of the Sun 386i 250's CPU and floating-point performance shows it is competitive with 25MHz 386-based microcomputers. Documentation is excellent, but the unit weighs 64 pounds and takes four linear feet of shelf space. Buyers must understand that the Sun 386i is still a Sun workstation, not a microcomputer.

9/3,AB/30 (Item 24 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01288701 SUPPLIER NUMBER: 07088168 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Minifinders.

MacUser, v5, n4, p245(14)

April, 1989

ISSN: 0884-0997

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT

WORD COUNT: 22699 LINE COUNT: 01842

9/3,AB/31 (Item 1 from file: 624)

DIALOG(R)File 624:McGraw-Hill Publications

(c) 2001 McGraw-Hill Co. Inc. All rts. reserv.

0432829

A Call to ARM

M1. M0 November, 1992M1. M0; Pg 293; M1. M0 Vol. 17, No.12M1. M0

Section Heading: Under The Hood

Word Count: 2,818 *Full text available in Formats 5, 7 and 9*

BYLINE:

Dick Pountain

9/3,AB/32 (Item 1 from file: 636)

DIALOG(R)File 636:Gale Group Newsletter DB(TM)

(c) 2001 The Gale Group. All rts. reserv.

04150912 Supplier Number: 54417584

New Products.

Video Systems, pNA

April, 1999

Language: English Record Type: Fulltext

Document Type: Newsletter; Tabloid; Trade

Word Count: 4482

9/3,AB/33 (Item 1 from file: 621)

DIALOG(R)File 621:Gale Group New Prod. Annou. (R)

(c) 2001 The Gale Group. All rts. reserv.

01363243 Supplier Number: 46260116
**APPLE GAME SPROCKETS TO ENABLE CUTTING-EDGE MULTIMEDIA AND INTERNET GAMES
ON THE MACINTOSH**
PR Newswire, p329SJF004
March 29, 1996
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1675

9/3,AB/34 (Item 1 from file: 813)
DIALOG(R)File 813:PR Newswire
(c) 1999 PR Newswire Association Inc. All rts. reserv.

0930418 SJF004
**APPLE GAME SPROCKETS TO ENABLE CUTTING-EDGE MULTIMEDIA AND INTERNET GAMES
ON THE MACINTOSH**

DATE: March 29, 1996 13:04 EST WORD COUNT: 1,677

9/3,AB/35 (Item 1 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2001 The Gale Group. All rts. reserv.

09075101 Supplier Number: 79131112
**VERSION CONTROL, WITH INTEGRITY -- MKS' Source Integrity VCS stands out for
its comprehensive platform support, ease of management and strong
security, but we'd like a license to kill ... its license.(Software
Review) (Evaluation)**
Macvittie, Lori
Network Computing, p69
Oct 15, 2001
Language: English Record Type: Fulltext
Article Type: Evaluation
Document Type: Magazine/Journal; Trade
Word Count: 4290

9/3,AB/36 (Item 2 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2001 The Gale Group. All rts. reserv.

06563817 Supplier Number: 55449861
VA LINUX SYSTEMS' VARSERVER S3500E.(Software Review) (Evaluation)
Foster-Johnson, Eric
UNIX Review's Performance Computing, v17, n10, p37
Sept, 1999
Language: English Record Type: Fulltext Abstract
Article Type: Evaluation
Document Type: Magazine/Journal; Trade
Word Count: 4848

ABSTRACT:
VA Linux Systems' VARserver S3500E is a powerful enterprise server that runs Red Hat Linux on multiple Pentium III Xeon processors and targets the high-end business market rather than home hobbyists. A configuration with four 500MHz PIII chips and a six-drive RAID array costs \$18,445; prices start at \$13,995 for a similar CPU configuration with 1GB of RAM and one 9GB hard disk. The **machine** 's physical design is that of a workhorse server, with security locks on the disk drives and outstanding expandability. Users can add up to 4GB of ECC memory, four Ethernet interfaces and three power supplies. The tested **machine** had four 450MHz Pentium II Xeon chips, whereas newer models run Pentium IIIs; performance is nevertheless excellent on standard SPEC benchmarks. Operation is very stable, and the system runs well-proven FTP and Web-server tools, including Apache. The VARserver earns an overall rating of excellent.

9/3,AB/37 (Item 3 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
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04272911 Supplier Number: 46260116
**APPLE GAME SPROCKETS TO ENABLE CUTTING-EDGE MULTIMEDIA AND INTERNET GAMES
ON THE MACINTOSH**
PR Newswire, p329SJF004
March 29, 1996
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1675

9/3,AB/38 (Item 4 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
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03082079 Supplier Number: 44197033
AMERICAN COMPANIES IN JAPAN: SEMICONDUCTORS AND COMPUTERS
Japan-U.S. Business Report, pN/A
Nov, 1993
Language: English Record Type: Fulltext
Document Type: Newsletter; Trade
Word Count: 4069

9/3,AB/39 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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13686669 SUPPLIER NUMBER: 76953688 (USE FORMAT 7 OR 9 FOR FULL TEXT)
COMPUTE FARMS: THE NEW DATA CENTERS. (Industry Trend or Event)
Moretti, Gabe
EDN, 46, 16, 54
July 19, 2001
ISSN: 0012-7515 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 3632 LINE COUNT: 00294

9/3,AB/40 (Item 2 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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12663680 SUPPLIER NUMBER: 65858648 (USE FORMAT 7 OR 9 FOR FULL TEXT)
EDN's 27th annual MICROPROCESSOR/MICROCONTROLLER DIRECTORY. (Buyers Guide)
EDN, 45, 19, 54
Sept 14, 2000
DOCUMENT TYPE: Buyers Guide ISSN: 0012-7515 LANGUAGE: English
RECORD TYPE: Fulltext
WORD COUNT: 25297 LINE COUNT: 02062

9/3,AB/41 (Item 3 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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12056927 SUPPLIER NUMBER: 61872547 (USE FORMAT 7 OR 9 FOR FULL TEXT)
dsp directory 16 bits. (Buyers Guide)
EDN, 45, 7, 62
March 30, 2000
DOCUMENT TYPE: Buyers Guide ISSN: 0012-7515 LANGUAGE: English
RECORD TYPE: Fulltext
WORD COUNT: 16676 LINE COUNT: 01348

9/3,AB/42 (Item 4 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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10154461 SUPPLIER NUMBER: 19240921 (USE FORMAT 7 OR 9 FOR FULL TEXT)
EDN's 1996 Innovator and Innovation competition.
EDN, v42, n4, p37(21)
Feb 17, 1997
ISSN: 0012-7515 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 14020 LINE COUNT: 01123

ABSTRACT: EDN magazine is holding the seventh yearly competition for Innovator and Innovation in the field of electronics. Winners will be known in the May 8, 1997 issue. A list of candidates is presented. These include Linfinity Microelectronics senior staff engineer Dean Wallace, David Bingham and Charlie Allen of Maxim Integrated Products, and Peter Eichenberger of Viewlogic Systems. Candidate innovations include the S631001 1-Mbit CMOS mask-programmable ROM, ZPSD4XX programmable microcontroller peripherals and system-programmable gate arrays.

9/3,AB/43 (Item 5 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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08563591 SUPPLIER NUMBER: 18145816 (USE FORMAT 7 OR 9 FOR FULL TEXT)
APPLE GAME SPROCKETS TO ENABLE CUTTING-EDGE MULTIMEDIA AND INTERNET GAMES ON THE MACINTOSH
PR Newswire, p329SJF004
March 29, 1996
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 1773 LINE COUNT: 00155

9/3,AB/44 (Item 6 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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08312956 SUPPLIER NUMBER: 17488513 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Digital tools for collaborative engineering. (Special CAD/CAM supplement)
Potter, Caren D.
Computer Graphics World, v18, n8, pS1(7)
August, 1995
ISSN: 0271-4159 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 3515 LINE COUNT: 00285

ABSTRACT: Technology that facilitates human interaction is now available for **concurrent** engineering and offers the potential for shorter design cycles. The multimedia approach to collaborative engineering has been limited to larger companies because these tools require an extensive communications infrastructure. There are three types of tools employed for **virtual** design review. Document conferencing, also known as CAD conferencing and whiteboard conferencing, is the most widely employed of the three. This approach enables people in separate locations to simultaneously view a CAD model. Application conferencing is similar, but participants see the model within the application, not on a whiteboard. Videoconferencing provides PC-based video capture and transmission tools, but the technology is not widely employed at this point because network protocols are not fast enough to synchronize audio and video.

9/3,AB/45 (Item 7 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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08159826 SUPPLIER NUMBER: 17339062 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Design software. (industry news) (Product Announcement)

Dorsch, Jeff

Electronic News (1991), v41, n2068, p44(2)

June 5, 1995

DOCUMENT TYPE: Product Announcement ISSN: 1061-6624 LANGUAGE:
English RECORD TYPE: Fulltext; Abstract

WORD COUNT: 1852 LINE COUNT: 00162

ABSTRACT: Major design automation **software** industry news includes an AT&T Design Automation organizational change, Chronologic Simulation's lawsuit against Viewlogic Systems and merger offer from Synopsys, Savantage's new SavantSys CAE tool and Quad Design Technology's new Quiet 2.0 electromagnetic interference (EMI) analysis tool. AT&T Design Automation is being moved from AT&T Microelectronics to AT&T Bell Laboratories where it will be one of the Lab's six functional 'centers.' Chronologic Simulation brought a lawsuit against Viewlogic Systems, which purchased the company in Mar 1995 over a competing offer from Synopsys. Chronologic asserts that Viewlogic did not disclose its true financial condition and is not allowing Chronologic the promised degree of autonomy. SavantSys enables electronic system designers to analyze and optimize circuit partitioning and packaging choices. Quiet 2.0 can simulate a variety of complex 3D EMI effects and resonance problems in systems.

9/3,AB/46 (Item 8 from file: 148)

DIALOG(R)File 148:Gale Group Trade & Industry DB

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08131062 SUPPLIER NUMBER: 17400679 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Desktop management software: no need to adjust your set. (Symantec's \$4,400 Norton Administrator for Networks 2.0, Intel's \$5,100 LANDesk Management Suite 2.01 and Microsoft's \$5,792 Systems Management Server network management software) (includes related articles summarizing the reviews and describing the testing process) (Software Review) (Evaluation)

Dornbusch, Margaret; Mace, Scott; Sercan, Ayse

InfoWorld, v17, n37, p60(10)

Sep 11, 1995

DOCUMENT TYPE: Evaluation ISSN: 0199-6649 LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 11943 LINE COUNT: 00971

ABSTRACT: Symantec's \$4,400 Norton Administrator for Networks 2.0 edges Intel's \$5,100 LANDesk Management Suite 2.01 and Microsoft's \$5,792 Systems Management Server (SMS) in a comparison of network management **software** packages. The Norton Administrator combines superior workstation inventory and client-side application monitoring with unique multi-operating environment support. Administrator provides **software** metering capability from both the local hard disk and server and is only marred by distribution tools that are too complex. The LANDesk offers the finest problem-solving environment, distribution feature and the only full-featured report generator of the three, as well as complex task automation via new scripting tools. However, its inventory feature misidentifies **software** and hardware. The SMS is difficult to configure, lacks **software** metering and misidentifies **software** , but it offers strong distribution features.

9/3,AB/47 (Item 9 from file: 148)

DIALOG(R)File 148:Gale Group Trade & Industry DB

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08124425 SUPPLIER NUMBER: 17389671 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Plastics technology: manufacturing handbook & buyers' guide 1995/96. (Buyers Guide)

Plastics Technology, v41, n8, pCOV(941)

August, 1995

DOCUMENT TYPE: Buyers Guide ISSN: 0032-1257 LANGUAGE: English

RECORD TYPE: Fulltext
WORD COUNT: 174436 LINE COUNT: 15187

9/3,AB/48 (Item 10 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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08094588 SUPPLIER NUMBER: 15936063 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Engineering software tools meet demands. (includes related article)
Van Tyle, Sherrie
Electronic Design, v42, n13, p71(6)
June 27, 1994
ISSN: 0013-4872 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 3632 LINE COUNT: 00313

ABSTRACT: Developers are producing advanced integrated tool environments that simplify computer-aided systems engineering. Integrated development environments reduce the time required by designers to synthesize their tools. Such environments constitute a complete operating system, which is usually comprised of a compiler, real-time kernel, debugger, network manager, language-interface libraries and a file management executive. Although small-company designers hesitate to invest in a tool environment, which entails royalties for each system sold and instead build their own operating systems and applications, they eventually turn to integrated tool environments due to time-to-market pressure. Designers have the formidable task of choosing what will work for their applications from among several development environments already in the market.

9/3,AB/49 (Item 11 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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06799981 SUPPLIER NUMBER: 15019112 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Technical tools. (for computer-aided engineering) (Buyers Guide)
Computer-Aided Engineering, v12, n12, p56(6)
Dec, 1993
DOCUMENT TYPE: Buyers Guide ISSN: 0733-3536 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 7829 LINE COUNT: 00710

ABSTRACT: A buyer's guide of technical **software** tools for computer-aided engineering (CAD) tasks, ranging in price from \$25 to \$300,000, is provided. Information includes product name, a brief description, price, platform and vendor phone and fax numbers. Products include 27 database and product data management packages that cover general database management and management specific to engineering needs and 48 drawing and document management packages that provide file tracking, raster-to-vector editing, file viewing and other features. Other products listed include 20 data translators, nine viewing **software** packages, 10 general-purpose two-dimensional drafting packages, six project management packages for large engineering projects, 14 rendering and animation packages, 23 program development **software** packages and seven **software** products for processing technical documentation and illustrations.

9/3,AB/50 (Item 12 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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06515890 SUPPLIER NUMBER: 14034564 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Computer equipment and software. (Industry Overview)
Miles, Tim; Streeter, Jonathan; Hoffman, Heidi M.; Woods, R. Clay;
Spathopoulos, Vivian; Swann, Vera A.; Smolenski, Mary; Kadar, Victoria A.
U.S. Industrial Outlook, p26-1(38)
Annual, 1993

DOCUMENT TYPE: Industry Overview ISSN: 0083-1344 LANGUAGE:
ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 35962 LINE COUNT: 03042

9/3,AB/51 (Item 13 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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05911500 SUPPLIER NUMBER: 12240966 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Multimedia moves from the drawing board to tangible products.
Nass, Richard
Electronic Design, v40, n10, p56(9)
May 14, 1992
ISSN: 0013-4872 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 5631 LINE COUNT: 00437

ABSTRACT: Multimedia is fast becoming a reality. Advancements in digital signal processing (DSP) have brought many multimedia products to market and are likely to be the driving force behind the future industry. DSP concepts have solved many hardware and **software** problems that were previously insurmountable. New DSP techniques have led to more standardization in multimedia products and features. Designers see multimedia as two separate categories: video and audio. As the technology becomes more mature, competing hardware and **software** vendors are aligning in an effort to market their own multimedia technologies in the hope that they will become de facto industry standards, such as Microsoft Corp.'s Multimedia PC. Detailed is an analysis of the industry and of competing standards.

9/3,AB/52 (Item 14 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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05193017 SUPPLIER NUMBER: 10903814 (USE FORMAT 7 OR 9 FOR FULL TEXT)
World IT sales grow 8.9% to \$278.5B; North America hits \$184.7B. (the top 100 revenue earners in the information technology industry) (includes related profiles of the Datamation 100 companies) (Cover Story)
Kelly, Joseph
Datamation, v37, n12, p10(53)
June 15, 1991
DOCUMENT TYPE: Cover Story ISSN: 1062-8363 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 46795 LINE COUNT: 03697

ABSTRACT: Datamation rates the top 100 companies in the 1990 global information technology (IT) market. The IT market is growing in 1991 despite a continuing recession in the North American economy. The growth of the worldwide IS industry was 8.9 percent to \$278.5 billion in 1990, which is up from the 5.3 percent growth the industry experienced in 1989. IBM is still the dominating force in the IS industry with revenues of \$67 billion for 1990; DEC is in second place with \$13 billion and Fujitsu Ltd is in third with \$12.36 billion in 1990 revenue. Workstation sales soared the highest for 1990 with a 34.7 percent increase in sales. The IT industry includes large-scale systems, midrange computers, microcomputers, peripherals, **software**, workstations, data communications, maintenance and services.

9/3,AB/53 (Item 15 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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04101425 SUPPLIER NUMBER: 07601004 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Power programming. (part 1 of a series on programming Intel's 80386)
Duncan, Ray
PC Magazine, v8, n16, p353(5)

Sept 26, 1989

ISSN: 0888-8507

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 3921

LINE COUNT: 00301

ABSTRACT: Programmers are understandably excited about Intel's new 80386 microprocessor. The 80386 is not just faster than the 80286, it has enormous **virtual** -memory address space, flexible on-chip memory management and pipelined execution; its instruction set is more powerful, regular and efficient than the 80286 and the 8086; and it offers complete backward compatibility with the 8086, 8088 and the 80286. While running in 32-bit protected mode, the 80386 is utterly different than either the 8086 or 80286 running in the same mode. Control programs, alternative operating systems and DOS extenders are currently available to help the programmer put the 80386 to work.

9/3,AB/54 (Item 16 from file: 148)

DIALOG(R)File 148:Gale Group Trade & Industry DB

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03502435 SUPPLIER NUMBER: 06264373 (USE FORMAT 7 OR 9 FOR FULL TEXT)

1988 the year of the data base: data base managers are taking center stage.

Bryan, Marvin

Personal Computing, v12, n1, p100(6)

Jan, 1988

ISSN: 0192-5490

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 4723

LINE COUNT: 00374

ABSTRACT: In 1988 over 20 new or significantly improved data base management programs will be available from data base program manufacturers. Advances have been made in user interfaces, storage, retrieval, reporting, connectivity to minicomputers and mainframe computers, multitasking, multiuser functions, network support and stand alone system support. Packages are available from Ashton-Tate, Microrim, Lotus Development, WordPerfect, Borland, DataEase, Apple and IBM. There are seven new data base products available for Macintosh microcomputers. Relational data bases will make up almost all of the data base products shipped by the early 1990s according to a Dataquest statistic.

?s s9 and (license (w) manager)

54 S9

897828 LICENSE

4178522 MANAGER

1043 LICENSE(W)MANAGER

S10 4 S9 AND (LICENSE (W) MANAGER)

?type s10/3,ab/all

>>>No matching display code(s) found in file(s): 65, 593, 623-624, 810, 813

10/3,AB/1 (Item 1 from file: 15)

DIALOG(R)File 15:ABI/Inform(R)

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00614132 92-29235

Moving C from DOS to UNIX Going from UNIX to DOS

Dichter, Carl; Binstock, Andrew

UNIX Review v10n6 PP: 29-38 Jun 1992 ISSN: 0742-3136 JRNL CODE: UXR

WORD COUNT: 3413

ABSTRACT: Steps involved in performing a port from DOS to UNIX include: 1. Scope the project. 2. Determine the extent of the differences. 3. Plan the changes required. 4. Move the files. 5. Get the data converted. 6. Get the programs to compile. 7. Test the programs and create regression test suites. 8. Optionally perform optimizations, and test again. 9. Make documentation changes. 10. Make marketing plans and materials. Once on UNIX, with its rich toolset, multiprocessing, and symmetrical access to memory, users can take advantage of these features. This may result in programs that are faster, smaller, and easier to internationalize. However, because DOS is a single-user, single-tasking system, a port from UNIX will

not only encounter architectural differences, but will require a different mind-set. DOS' most famous limitation is its inability to access more than 640KB of RAM. To solve this problem, DOS extenders have been developed that allow applications to access a linear 32-bit address space and still call DOS services.

10/3,AB/2 (Item 1 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

02545913 SUPPLIER NUMBER: 79131112 (USE FORMAT 7 OR 9 FOR FULL TEXT)
VERSION CONTROL, WITH INTEGRITY -- MKS' Source Integrity VCS stands out for its comprehensive platform support, ease of management and strong security, but we'd like a license to kill ... its license.(Software Review) (Evaluation)
Macvittie, Lori
Network Computing, 69
Oct 15, 2001
DOCUMENT TYPE: Evaluation ISSN: 1046-4468 LANGUAGE: English
RECORD TYPE: Fulltext
WORD COUNT: 4290 LINE COUNT: 00337

10/3,AB/3 (Item 2 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
(c) 2001 The Gale Group. All rts. reserv.

01516556 SUPPLIER NUMBER: 12180072 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Moving C from DOS to UNIX: a successful port requires thoughtful design, careful implementation, and a lot of work. (includes a related article on moving from UNIX to DOS) (Tutorial)
Dichter, Carl
UNIX Review, v10, n6, p29(6)
June, 1992
DOCUMENT TYPE: Tutorial ISSN: 0742-3136 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 3617 LINE COUNT: 00277

ABSTRACT: The process of porting a **software** package from DOS to UNIX is described, beginning with a discussion of the differences between DOS and UNIX. The port begins by determining the scope of the project, finding the extent of the differences, planning the required changes, moving the files across, converting the data, compiling the programs, testing the programs and creating regression test suites, performing optimizations and retesting (optional), making documentation changes, and developing marketing plans and materials. A primary difference between UNIX and most other operating systems, including DOS, is that wildcard expansion, or globbing, is done in the shell for most programs; a difference in command-line processing is that options in UNIX begin with a dash, whereas in DOS they begin with a slash. Differences in file names, graphics and screen management, and other aspects of the porting process are described.

10/3,AB/4 (Item 1 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2001 The Gale Group. All rts. reserv.

09075101 Supplier Number: 79131112
VERSION CONTROL, WITH INTEGRITY -- MKS' Source Integrity VCS stands out for its comprehensive platform support, ease of management and strong security, but we'd like a license to kill ... its license.(Software Review) (Evaluation)
Macvittie, Lori
Network Computing, p69
Oct 15, 2001
Language: English Record Type: Fulltext

Article Type: Evaluation
Document Type: Magazine/Journal; Trade
Word Count: 4290
?type s11/9/3
>>>Set 11 does not exist
?type s10/9/3

10/9/3 (Item 2 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01516556 SUPPLIER NUMBER: 12180072 (THIS IS THE FULL TEXT)
Moving C from DOS to UNIX: a successful port requires thoughtful design, careful implementation, and a lot of work. (includes a related article on moving from UNIX to DOS) (Tutorial)
Dichter, Carl
UNIX Review, v10, n6, p29(6)
June, 1992
DOCUMENT TYPE: Tutorial ISSN: 0742-3136 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 3617 LINE COUNT: 00277

ABSTRACT: The process of porting a **software** package from DOS to UNIX is described, beginning with a discussion of the differences between DOS and UNIX. The port begins by determining the scope of the project, finding the extent of the differences, planning the required changes, moving the files across, converting the data, compiling the programs, testing the programs and creating regression test suites, performing optimizations and retesting (optional), making documentation changes, and developing marketing plans and materials. A primary difference between UNIX and most other operating systems, including DOS, is that wildcard expansion, or globbing, is done in the shell for most programs; a difference in command-line processing is that options in UNIX begin with a dash, whereas in DOS they begin with a slash. Differences in file names, graphics and screen management, and other aspects of the porting process are described.

TEXT:

Porting from DOS to UNIX is a lot like moving from a cramped mobile home that you own into a cavernous hotel. You suddenly have all the room you want, but many resources must now be shared. In this article, I explore the issues involved in making such a move and provide you with information that will save a lot of frustration. While I cannot cover all the issues in one article, I do address the broad issues and point out nettlesome problems often overlooked when planning a port.

First, let's cover the steps in performing a port and discuss differences between DOS and UNIX where they are a factor. At the end of the article, the differences are listed explicitly. Steps in doing a port include:

- * Scope the project.
 - * Determine the extent of the differences.
 - * Plan the changes required.
 - * Move the files across.
 - * Get the data converted.
 - * Get the programs to compile.
 - * Test the programs and create regression test suites.
 - * Optionally perform optimizations, and test again.
- You probably will support the following steps as well:
- * Make documentation changes.
 - * Make marketing plans and materials.
- Let us examine these steps in detail.

Scope the project. A common mistake when porting is to put effort in the wrong area. I worked at one company where the developers were told to port a PC product to UNIX because the PC would no longer be supported. They spent about four man-months replacing PC-specific graphics code with Xt calls. When the company decided to continue the PC product-only as a loss leader-the developers spent another few months putting in multiple-platform support.

So, are you going to continue to support DOS? One option is to consider supporting only POSIX-compliant operating systems, which includes most versions of UNIX, OS/2, and VMS.

On DOS, the terminal type, printer, mouse, modem, and other peripherals generally came in only a few flavors (many brands and models, but conforming to a few standards). Now you have to decide:

- * Which printers, plotters, terminals, pads, stylus, and mice are supported?
- * Which print spoolers?
- * What communications are supported: what protocols? what modems? how many communication lines?

Now that you are moving to a multiuser system, you may have some new requirements:

- * Will you support more than one user at a time in your system? To what extent are you going to support **concurrent** data access?
- * Will your data be distributed or centralized? If your data is distributed, your current file/record locking scheme may not work (remember how hard it was to get it working in a DOS network)?
- * Should you remove (or `#ifdef` out) any security code you put in? That is, can the security code be removed since more security is provided in UNIX than in DOS?

One of the reasons you may have decided to move to UNIX was to pursue "openness" and connectivity, so you also have to know:

- * What standards must the product meet, and how are you going to prove that the standards are met?
- * Will the ported **software** be compatible with other products?
- * What are the performance and capacity requirements of the product?
- * Will the ported **software** support international character sets?

Because so many issues must be addressed when doing a port, many companies recommend writing a specification for a port before beginning. Motorola Commercial Systems Division has a template available for such a specification, written by Jonathan Ma with Brian Smithson. Although it is mostly designed for vendors porting from other UNIX boxes to the Motorola MPC, it provides guidance on most porting issues.

With such a specification completed, marketing, test, and documentation people can all start their part of the effort. Test and documentation plans can be incorporated into the porting specification.

Determine the extent of the differences. When porting across architectures, it is always advisable to know how your compilers handle data items and how closely this handling conforms to applicable standards. Figure 1 shows some of the differences exhibited by C compilers on various UNIX platforms. The C programs in Figures 2 and 3 will give you some of the required information about your compiler and host **machine**.

The program shown in Figure 3 (`ansi.c`) exploits some ANSI features to test ANSI compliance. If this program compiles and runs correctly, your compiler is probably ANSI-compliant. To know for sure, you will have to use a full validation suite.

If your source code and target UNIX system are different with regard to ANSI-compliance, you can add or remove ANSI function headers with "protoize" and "deprotoize" programs posted on Internet.

By compiling and running each program on a DOS **machine** and on the target UNIX **machine**, you will get a rough idea of how different the systems are. Bear in mind that graphics will still require a lot of revision-more on this later.

Plan the changes required. Now that you have scoped the project, you have a good feel for what changes are required beyond the compilation and testing phases.

You now must plan these changes to meet the criteria in your specification. In doing so, keep the following trade-offs in mind:

- * Any change in functionality may reduce your ability to compare results, or exchange data, with the PC application.
- * Any change in functionality increases the risk of introducing new errors or decreasing downward compatibility.
- * Increases in functionality that cannot be ported back to the PC increase the marketability of your UNIX version. This situation is desirable because you can probably charge more for the sale and support of your UNIX version.

Get the files across. It is important to have a reliable link between the UNIX system and the PC, not just for the initial file transfer, but for later use as well. Such a link could replace files that have been lost or corrupted, move programs back to check that they still compile and work on DOS, and move data back to check compatibility.

Many transfer protocols take care of problems with file names and with ASCII end-of-line character differences. Most versions of zmodem (rz,sz), telix, kermit, ftp, MLINK, and BLAST resolve these problems.

Not all communication packages can move entire directory hierarchies, so this feature should be a factor in your choice if you have a complex directory structure. You can archive the directory structures and then transfer them with one file. Archivers like zoo and tar are available in the public domain for both DOS and UNIX.

A package called mtools is also available in the public domain, and it allows UNIX systems to access DOS floppy disks, assuming the UNIX system has a compatible floppy drive.

Be sure to convert your data. As previously noted, certain communications programs handle some of the differences between DOS and UNIX, but only if your files are ASCII. If your files are binary and are not stored in a heterogeneous manner, you will need to convert, or recreate, the data.

Get the programs to compile. Portability problems are caused by differences in **machine** architecture, language implementation, and library differences. Extended keywords, like those caused by the various memory models of the 80x86 family (such as near, far, huge), and optional features (asm, cdecl, interrupt) are nonportable.

Oddly enough, many UNIX compilers are behind when it comes to ANSI C conformance. It was even worse a year ago, when most workstation vendors (such as Sun and Apollo) had little or no compliance. If you look at Figure 1, you will notice that as of this writing, a couple of the compilers are now fully ANSI-compliant.

Applications with graphical user interfaces need the most effort. A typical experience is that of Image **Software** (Danville, CA). Developers there ported its Graphics Editor **software** to UNIX and Motif on the Motorola MultiPersonal Computer. Although the non-graphic code ported to UNIX (Motorola System V/88 Base Operating System) with minimal changes, almost 40% of the code was graphic-related and had to be rewritten. The developers used UIM/X (available from Quest Systems) to recreate their Microsoft Windows GUI for X11R4 and OSF/Motif using rapid prototyping.

Rapid prototyping is the fastest way to create user interfaces. In most cases, the re-creation of a GUI under rapid prototyping is much faster than its initial creation with an intrinsics-based toolkit.

While Quest UIM/X is a good way to create user interfaces for C, PC users who currently use C++ should look into Quest's Objectviews.

Try to use header files to manage the differences (where possible), rather than clutter all the code with #ifdefs. This step is also beneficial because it places all knowledge of the differences in one place.

It is also a good idea to modularize your programs such that graphics, I/O, and other high-risk areas are isolated.

Test the programs and create regression test suites. When testing your programs on UNIX, remember to concentrate on the areas that are most system-sensitive. Where possible, you want to create your regression test data on DOS. In other words, run the program under DOS to create "correct" output files, which can be compared with the UNIX version.

As you create tests for your program, you should automate testing with a shell script or a makefile. Since PC versions of make exist, it is possible to create automated regression tests that can be used in DOS and UNIX.

Perform optimizations and retest. Now that you are on UNIX, with its rich toolset, multiprocessing, and symmetrical access to memory, you can take advantage of these features. This may result in programs that are faster, smaller, and easier to internationalize. Many features cannot be exploited if you are planning to continue to support DOS.

Take advantage of increased access to memory by increasing buffer sizes and moving tasks performed in separate subprograms into one program.

Take advantage of multiprocessing by using pipes rather than intermediate files, and consider adding multitasking (such as using fork or

vfork).

Take advantage of better functions (such as ftw: file tree walk) to replace complicated C code.

After adding optimizations, remember to regression-test your code.

Command-line processing. One of the big differences between UNIX and most other operating systems, including DOS, is that globbing (wildcard expansion) is done in the shell, although it may also be done in the program. In UNIX, only some programs (like find) need to perform globbing since the shell does it for you. In DOS, the program must explicitly call a function to do this.

Another difference in command-line processing is that in UNIX, options begin with a dash. On DOS, they begin with a slash.

An area with many differences is the file system. The file-path delimiter is a slash in UNIX and a backslash in DOS. Slashes inside file names are illegal in both. In DOS, a command (called switch in most versions) is available to change the path delimiter character.

In DOS, file names are case-insensitive but are stored in the original case. Many special characters are legal on both systems (anything but slash in UNIX) but may cause problems in some situations-so avoid anything except alphanumeric, underscore, and a single period. In UNIX, file names are case-sensitive and stored in the original case.

In DOS, file names are limited to eight characters of name and three of file-name extension. A period is only legal as a separator between the file name and the extension. All POSIX-compliant systems have a minimum limit of 14 characters. UNIX does not really have a concept of a file-name extension-the period is just another character and can occur any number of times in a file name (except the . and .. file names, which are used for the current and parent directory as in DOS).

In DOS, extra path delimiters mess up a file path. In UNIX, this is not a problem. This feature makes some user-interface issues less complicated in UNIX.

In DOS, lines in a file are terminated with carriage return/linefeed sequence (ctl-M and ctl-J). In UNIX, they only have a linefeed.

In DOS, setting an attribute hides the files from the directory command. In UNIX, you can hide files from shell globbing and the default behavior of ls (the UNIX equivalent of dir) by beginning the name with a period, or you can hide the contents of an entire directory from ls by removing read protection from the directory.

Graphics and screen management. Graphical user interfaces will have to be rewritten or recreated for the X Window system, although some non-X graphics toolkits are portable. Textual interfaces can be ported easily to curses or other screen managers available on DOS or UNIX.

For data communications, you must resolve the issues of arbitrating ownership of the modem (serial port), dealing with various command structures, and perhaps supporting different communications protocols in the LTNIX area than in DOS.

Most UNIX systems do not use any smaller memory models and therefore do not support extended keywords related to this (such as near, huge, far).

DOS does not have multiprocessing. Many programs on DOS are split into separate subprograms just to get around this problem and memory limitations.

Definitions for functions may be missing or different. If the program was developed on a PC, it may have nonstandard functions, even for doing the most basic things.

In DOS, a change to the environment, like changing directories, persists after the program that performed the change has terminated. [Generally but not always true -Ed.] In UNIX, such a change only affects the current shell and children of the current shell.

Because DOS is interrupt-driven and single-tasking, applications ported to UNIX may be less "real-time." If your application needs to be real-time, you may need to move to a real-time UNIX or put interrupt-driven code in device drivers.

Since DOS is single-user, you had free rein to use the printer, modem, or terminal. In UNIX, you don't own the hardware. Some of these devices have arbitrators already, like the print spooler. On some others, you will need to develop a scheme to share the device.

On DOS, you probably sent characters to the printer by a DOS service

or by opening and writing to the printer port. In UNIX, you'll open and write to a pipe for the print spooler. It is important not to close the pipe (expecting to reopen it later) each time you've sent some output there. If you do, your printout will be split up--other jobs may even come out in the middle of yours. In other words, open and close the printer pipe only once.

On DOS, the terminal, modem, plotter, and printer types were pretty much alike. On UNIX, you may be talking to the whole world of peripherals.

The copy-protection scheme you used on DOS probably won't work. Traditional copy protection might not be required since the type of customer supported under UNIX is not the typical "software pirate." However, because of the higher selling price of "big" system software and the ease with which one can inadvertently violate software copyrights, protection may be necessary.

On UNIX, especially workstations, the trend is toward floating licenses. You can purchase software to do this, such as FLEXlm, a flexible/floating license manager from Highland Software.

Porting software, especially from a single-user PC to a multiuser system like UNIX, involves more than is readily apparent. It also has lots of benefits that are not immediately obvious.

Planning what you want to do and how you plan to do it are at least as important in porting software as the original software creation.

Carl Dichter is a software engineer/scientist at Motorola's ASIC division in Chandler, AZ.

Going from UNIX to DOS

Carl Dichter's article on porting code from DOS covers many of the critical issues that arise when porting code from one operating system to another. This sidebar expands on his work to touch upon the DOS-specific items.

Architecture. Because DOS is a single-user, single-tasking system, a port from UNIX will not only encounter architectural differences, but it will require a different mindset. Daemons cannot blithely be created nor processes happily forked (for that matter, they cannot really be forked at all). The closest DOS will come to the appearance of two tasks running simultaneously is the terminate-and-stay-resident program (TSR). A TSR is loaded into main memory before the principal application and can be accessed by time slicing or by trapping an event, such as pressing a unique key combination. Alas, TSRs are notoriously difficult to program, rely on undocumented DOS services, and are limited in what they can do. Moreover, when the TSR program is active, the main application is dormant. DOS really is a single-tasking system. So pull out forks and task spawns, and build those functions directly into your application.

Memory. DOS's most famous limitation is its inability to access more than 640KB of RAM. If no workaround were available, this crippling limitation would preclude porting most UNIX applications, save for the occasional utility. However, the recent availability of DOS extenders allows applications to access a linear 32-bit address space and still call DOS services. Some DOS C compilers bundle free DOS extenders (Watcom, Zortech, JPI, and Intel); however, most professionals rely on third-party extenders. The three primary vendors are Phar Lap (my personal favorite), Rational Systems, and Ergo Computing. All three vendors charge a minimal royalty scheme but provide constant upgrades to match DOS's evolution. In addition, they provide technical support for porting UNIX apps to DOS. Compiler vendors who bundle extenders tend not to support the extenders. If you are porting to DOS to sell to that market (rather than for in-house purposes), use third-party extenders. For in-house work with straightforward projects, the compiler-supplied extenders are probably adequate.

It is not enough to worry about extenders. You must further change your mindset. Most DOS systems today are sold with 1MB to 4MB of RAM. Few systems sport 4MB, and fewer still support more than 4MB. So, if your ported application (with DOS extender) expects 12MB of RAM, you can here and now predict your DOS sales for the first year: exactly zero. Learn to conserve memory, allocate space as you need it (that is, dynamically), and use temporary files.

GUIs. The most popular GUI on DOS is Microsoft's Windows. Porting to Windows is an expensive proposition. First, Windows programmers are scarce,

busy, and hence expensive. Windows is a difficult GUI (although it comes nowhere close to X-based GUIs) and will noticeably slow down your application's performance. However, the Windows look and feel will be familiar to your potential DOS customers, and this could be a key selling point. One way out is to code your application for a **virtual** toolkit such as CommonView 3 from ImageSoft. The GUI source code is then directly portable across Windows, Motif, and Macintosh, with a simple recompilation. If you are planning to run on multiple GUIs, a **virtual** toolkit should be seriously considered. **Virtual** toolkits do have drawbacks, however. Most notable is that the ported application will have an interface not typical of applications for that platform. Motif screens and forms do not look like Microsoft Windows, which themselves do not much look like Macintosh's design (Apple's lawsuit against Microsoft notwithstanding). Hence, to your ultimate customer, the ported GUI will look unusual. This is much less of an issue if the application is to be used in-house only. Under all circumstances, however, give the GUI issue considerable thought, as it will be the area of greatest coding and recoding.

Source Code. Carl Dichter's article gives a number of suggestions on porting C code, and all should be considered carefully. I would enhance them with static analysis tools that identify likely areas of nonportability. The best of these tools, by far, is PC-lint from Gimpel Software (known as Flexe-lint on the UNIX side). It goes so far beyond today's lint utilities that to call it lint at all is to damn it with faint praise. It will generate a comprehensive list of all constructs that could generate portability issues. By using command-line switches, you can selectively turn the various warnings on and off, so that after evaluation of the risks, you can focus on those constructs that do impair portability to DOS. You will likely find other suspicious coding practices in the process. Design your port carefully and with these DOS-specific issues in mind, and your path to 40 million PCs will be less bumpy. -Andrew Binstock

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DESCRIPTORS: **Software** Migration; Code Conversion; Program Development Techniques; Tutorial; MS-DOS; UNIX; Command-Driven User Interfaces; Programming Instruction; Programming Management

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FILE SEGMENT: CD File 275

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737928 VIRTUAL
1244747 MACHINE
22829 VIRTUAL(W)MACHINE
897828 LICENSE
4178522 MANAGER
1043 LICENSE(W)MANAGER
6097440 SOFTWARE
247997 FLOATING
897828 LICENSE
1398 FLOATING(W)LICENSE
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SOFTWARE AND (FLOATING (W) LICENSE)

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>>>No matching display code(s) found in file(s): 65, 593, 623-624, 810, 813

11/3,AB/1 (Item 1 from file: 148)

DIALOG(R)File 148:Gale Group Trade & Industry DB

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VHDL Design Project - Part 4) (includes related articles on VHDL

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11/9/1 (Item 1 from file: 148)
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TEXT:

Like designing hardware of **software**, writing a VHDL (VHSIC Hardware Description Language) model isn't a linear process. It involves many iterative trials, tests of hypotheses, and corrections. While the model of the Z80 that EDN has presented over the previous three issues was progressing, I still had to find and fix the syntax and semantic errors as well as the functional ones. These reconnaissance missions made typing the code look easy.

When writing the model, I used the screen editor that HP delivers with the DN4500 workstation. Although not as powerful as Unix editors vi and emacs, the DN4500 screen editor is functionally similar to vi and far simpler to use. The HP editor's simplicity and my familiarity with it were two of my primary reasons for choosing this editor. My practice was to write a block of code containing 100 to 500 lines and then analyze the code to check syntax. In Part 3 (EDN, February 4, 1992), I recommended the programmer's trick of opening and closing all constructs as you write them to ensure proper syntax. This technique also enables you to test the syntax of your program incrementally as you construct it. As long as all of your design elements have both the declarations and END statements, the model will analyze properly--even if it is functionally incomplete.

Testing the model's function is more complex. Although you can use the simulator to force the model's inputs to particular logic states and monitor the outputs inside the simulator, this approach is not rigorous. A

more formal technique uses a VHDL construct called a testbench, which is a self-contained test program. In addition to the functional model, the testbench contains the vectors that drive the model. Ideally, the testbench can also compare the model's output with the expected results of a simulation.

The tool I used to check the model's syntax, semantics, and function was Vantage Analysis Systems' VHDL Spreadsheet. The tool is a **software** debugger in function, but bears a strong resemblance to and performs as a logic simulator. It provides an interface to its capabilities that is relatively simple to learn and use. The **software**'s ease of use was critical because of the relatively poor documentation that accompanied the tool. The documentation's weaknesses included such problems as nonexistent cross-references, unexplained error messages, and confusing or missing explanations. A good user interface often made trial and error the fastest way to solve many problems, though calling the customer-support lines was the most direct.

The Vantage analysis and simulation tool assumes that designers spend the bulk of their model-development time executing their models (see box, "Simulators operate differently") and therefore is optimized for simulation. In the early stages of the design project, however, I spent more time compiling pieces of the design. I was far more concerned then with the accuracy of the syntax and semantics of the design--and my use of VHDL--than I was with the function of the model. (Recognizing these priorities, Vantage has equipped its latest release of the analyzer/debugger with such features as design-unit-level incremental compile to minimize recompile times.)

Although I'd been using the compiler as a syntax checker, I actually wasn't ready to use the simulator/ debugger until I'd finished the reset logic. Because I had implemented the reset logic using a VHDL procedure, I couldn't test it directly. Instead, I needed to embed the procedure inside a VHDL architecture, couple the architecture to an entity, and then embed the entity inside a testbench. In addition to the reset logic, the testbench contained both the force vectors for the inputs and the result vectors for the outputs. I might have used a more obvious approach to building this test rig.

The obvious approach would have been to use the Z80 entity/architecture pair and Z80 testbench for testing the procedures. I could write the procedures and put them inside the Z80 model without connecting them to each other. As I tested and debugged the individual pieces, I could rename their inputs and outputs so data moved among the appropriate procedures. Unfortunately, this approach had a flaw.

Data can move into and out of procedures through either signals or variables. Data can move into and out of entities only through signals. Therefore, unless all of the data entering and exiting a procedure is a signal, you can't connect the procedure directly to an entity. As a result, I built individual entity/ architecture pairs and testbenches for each procedure instead.

Sometimes the most obvious solution isn't necessarily the most appropriate. In addition to the obvious, consider alternate approaches and the advantages and drawbacks to each.

As a previous article in the series explained, VHDL defines precedence among elements. This precedence is logical; for example, you can't use something before you define it. As a result, when you compile parts of your design into a library, the library must already contain definitions of all of the instantiated and referenced elements in the part you're compiling. Similarly, when you recompile a lower-level definition, you invalidate all of the elements that reference that definition. If you recompile just the elaboration of a low-level element--and not the definition--then the higher-level elements don't need to be compiled.

This precedence led me to organize the EDN model to expedite compile run times. I grouped all of the procedure declarations into a package and all of the procedure elaborations into a package--body. Then, as long as I didn't change the interface to a procedure when I modified it, all I had to recompile was the package--body. I didn't need to recompile the package, the architecture, the entity, the configuration, or the testbench. Had the model contained the procedure declarations and elaborations in a single file, any time I modified and recompiled that file, I would have had to

recompile all elements that referenced it or any of the higher-level elements. These compilation dependencies are a primary reason for separating packages and package--bodies--the other reasons include smaller compiled-code size and, therefore, faster recompilation.

As the model progressed, and compile times of the package--body stretched into the tens of minutes, I divided all of the procedures among several package/package--body pairs. Without all of the procedures, the actual Z80 model became little more than variable declarations and a few lines of code to call the bus-arbitration procedure. Breaking out the procedures among multiple packages illustrated that compile times grow geometrically, rather than linearly, with package size.

While dividing the procedures among multiple packages, I stumbled on a feature of VHDL that is wisely conceived, though the Vantage **software**'s error messages explained it poorly. I inadvertently compiled one of the procedures into the wrong library, thereby creating copies of the procedure in two different libraries. When I subsequently tried to compile the architecture that referenced it, the compiler claimed to be unable to find the procedure. VHDL specifies that if it can find two procedures with the same name, it won't try to figure out or ask you which is right. Instead, it will ignore them both. The error message wasn't wrong, it just could have been more descriptive. Deleting one version of the procedure eliminated the error.

The efficiency of using multiple smaller packages came at a cost beyond the time required to divide the model. The model had created a hierarchy that started with type-conversion functions then progressed up to the procedures that implemented the instruction sets, the execution unit that called those procedures, the instruction decoder that called the execution unit, and the bus arbitrator that called the instruction decoder (Fig 1). Each level of the hierarchy added baggage to the interface list of the level above it. As a result, the bus-arbitration unit at the top of the hierarchy had a long interface list. This list caused some problems.

When I tried to compile the model, each of the procedures compiled normally. Unfortunately, when I tried to compile the architecture that referenced them, the compiler crashed. The error messages weren't illuminating, so I contacted the people at Vantage. Initially, they guessed that the model contained some circular referencing of procedures in different packages, so I carefully examined all of the packages. After I'd eliminated that possibility, I E-mailed them the model. They conducted several experiments and found that the C compiler on the DN4500 can only pass 127 or 128 parameters into procedures. The EDN model exceeded that limit. To confirm that diagnosis, the Vantage engineers tested and compiled the model on a workstation whose C compiler didn't have such a limitation.

This problem and its solution both puzzled and troubled me. I was concerned that the C-compiler limitation would require me to do the model's architecture. More important, I hit an apparently substantial obstacle with a relatively small design. How do designers write models for larger projects? The question prompted a response I would hear several times during the project: "Your model doesn't use the coding style we typically see."

Typical approaches aren't necessarily the right approaches; neither are they inherently the wrong ones. Choose the approach that best suits your style and background, but be aware that the inconsistencies may stretch the capabilities of the tools you use.

As I mentioned earlier in the series, after I made several false starts, Bill Billowitch of The VHDL Technology Group (Bethlehem, PA) provided me with a basic template for writing the model. Although Bill is a model writer's model writer, his background is **software**. Therefore, his template had a **software** bias. Typically, according to Vantage and others who saw my model, hardware designers tend to build function blocks not as subprograms but as entities. Then, they instantiate these entities into their design so that the final model contains a collection of elements much like those of a Spice or gate-array net-list. This approach offers the additional convenience of allowing each function block to be tested as a stand-alone element.

Bill assuaged my fear that I'd have to transform the design radically when he suggested that I need not declare and define the bus arbitration and reset procedures in packages. Instead, he recommended that I define

them in the declarative portion of the architecture of the 230 model after the declaration of all of the variables. With the procedures defined here, all of the variables would be global to these procedures, and I could eliminate all of the variables from the interface lists. Modifying the model in this way sidestepped the compiler limitation and allowed the **software** to compile the entire model.

Unfortunately, this solution uncovered another problem with version 3.010 of Vantage's tool. When I tried to enter the simulator, it crashed. The "Unrecognized IPC Channel ID" and "reference to illegal address" error messages were insufficient explanation for me to determine the failure mode, so again I sent the model and crash symptoms to Vantage for analysis.

The analysis determined that Bill's fix created another problem. Version 3.010 of the **software** can't create drivers for OUT- and INOUT-mode signals that aren't explicitly declared in a parameter list. Again, the solution to the problem was relatively simple; I created parameter lists for just the OUT- and INOUT-mode signals. Fixing this problem allowed me to begin finding functional errors.

To find them, I needed to include simulation vectors (test patterns) in the testbench. From the start of coding the model, I had puzzled over how to test its design. I considered several ways to generate the test patterns, eventually settling on what should have been the most obvious. I requested the actual test program for the 280 from Zilog. Unfortunately, these test patterns were a collection of 1s and 0s in Fairchild Sentry format, incompatible with what we needed for the VHDL testbench. To make these patterns usable, I wrote a test-bench and defined a specification for the test patterns. EDN Magazine Editor Jon Titus wrote a Basic program that read the test-pattern file, parsed the data, and generated the appropriate input and output formats. I then incorporated the formats in the testbench.

When we tried to compile the testbench, even a modest 50 cycles' worth of pattern data caused the compiler to run out of swap space and crash. Eliminating the output data from the testbench disabled output checking but allowed the 50-cycle testbench to compile on the DN4500 with 16 Mbytes of memory--in 8 hours.

A typical debug philosophy would have been to simulate the model, find and correct an error, then resimulate. The long compile times demanded that I find a more efficient way of debugging the model. The method I used was to simulate; find an error and decide how to fix it; then back up the simulation to before the error; override the logic that caused the error so the simulation appeared error-free; and go on to the next error. I tried to find as many errors as possible and recompile overnight. In practice, three or four errors was the limit before I'd start to worry about the side effects of unsimulated (paper) logic changes making an impact on the rest of the design. I also realized that although this method would ultimately debug the model, there had to be another way that would require less compile time and allow more efficient model debugging.

One possible approach was to remove the 1s and 0s from the testbench and keep them in a separate file. Unfortunately, many of the designers I'd spoken to about VHDL had complained about VHDL's handling of file I/O. Neither of the two courses I'd taken at the start of the project addressed it. None of the texts I consulted offered anything useful. Again, Bill Billowitch came to the rescue. His company was working on several libraries of functions that it planned to license to VHDL modelers. These libraries, called the Std--DevelopersKit, offer a host of useful features in five packages.

Std--SimFlags provides the ability to specify global timing, voltage, temperature, and load-derating functions for your design without eliminating the ability to control these function specs at the local level. The package also offers variable X state handling assertions and X-state propagation. Std--MemPak has memory-system development tools for systems that incorporate such components. Std--RegPak includes routines for adding, shifting, comparing, and mathematically manipulating VHDK-modeled registers. Std--Timing is the timing package that provides a mechanism for building minimum, maximum, and typical timing on a system-wide or local-component basis. Either I'd already written these capabilities into the EDN model or they were peripheral to my particular needs. I did need file I/O, however, and this was addressed by the fifth package, Std--IOPak, which I was able to use.

I couldn't use the test of the Std--DevelopersKit, because the software wasn't finished. However, EDN commissioned Bill's organization, The VHDL Technology Group, to write a test-bench that would read the Zilog Fairchild Sentry test patterns, parse the data, apply the inputs to the Z80 model's inputs, and compare the outputs with the Z80 model's outputs. It took Bill's organization about three weeks to get us the testbench and another week or so to smooth out the various wrinkles.

Set appropriate expectations. If you expect to find bugs and deal with incompatibilities, you won't be disappointed. On the other hand, if you don't find any, you'll be ecstatic.

Several errors appeared to inhibit compilation. Bill suggested that the problems may relate to my version of the Vantage software. I had version 3.010, the current version was 3.101. After requesting and installing an upgraded version of the software, I recompiled all of my models. The model's packages, entity, architecture, and configuration took about 20 minutes. The Std--DevelopersKit compile took a couple of hours, and the testbench and an associated file of procedures to parse the Sentry test patterns compiled in less than 10 minutes. Just for comparison, I compiled the testbench I'd been using; the compile time fell by less than 30 minutes to around 6 hours 45 minutes.

Still, I found several problems. One problem was that the engineers in Bill's group commented out the Z80 model instantiation in both the architecture and the configuration to allow them to debug the testbench as they wrote it. I figured this out after seeing all the inputs driving but none of the Z80 outputs responding. Then, after I added the model to the testbench, I couldn't get the testbench to compile; the error was something about the types of the Z80 model and the testbench being incompatible.

That error drove me crazy because all of the signals in both the model and the testbench were of type std--Logic. Then, it occurred to me that Bill's Std--DevelopersKit also provided an IEEE library that contained an MVL (multivalued logic) system. A little detective work confirmed that the new MVL system and the one I'd been using were inconsistent and therefore incompatible. To make the model consistent, I re-edited all of the packages, architectures, and entities to replace the old logic system with the new.

Despite these problems, the result was worth the wait. Because the testbench no longer contained all of the input and output data, compile times for the entire model were reduced to under 30 minutes--though simulation runtimes were still longer than ideal. (Keep in mind, though, that unless they are instantaneous, they are longer than ideal.) Modeling and error checking combined to generate 15-to 20-minute runtimes for 10 [mu]sec worth of simulated cycle time. On the other hand, I could now debug and correct one error at a time and ensure that the corrections didn't introduce additional errors. I quickly added several debug signals to the testbench and model to provide graphical evidence of the kind of simulation cycle the model is executing and when the model and test patterns disagree. In simulation, variables are visible only locally, whereas signals are always visible. Thus, the debug signals I added converted variables to signals for easier viewing.

One of the first language-related problems I came across during simulation was a variable mysteriously changing value when the model called a procedure in which the variable was declared as an OUT. The LRM (Language Reference Manual, Ref 1) requires the compiler to make a copy of all signals declared as INOUTs and OUTs when the model calls a subprogram. Unfortunately, the language makes no allowance for variables that aren't assigned values in the procedure; by default, the language assigns them the value of |LEFT--the first value in their type declaration. As a result, if a variable declared as an OUT entered a procedure as a |1' and wasn't assigned any value, it would leave the procedure as a |0'. The solution was to assign INOUTs to all parameters that were currently declared as OUTS.

This modification demonstrates one of the major annoyances of most--if not all--implementations of VHDL. Because this change was to the procedure interface list, I had to modify the package declaration, the elaboration, and every reference to the procedure in the model and other packages. Clearly, dynamically linking all of the references so that I'd only have to make the change once would be easier, quicker, and less prone to errors.

As I debugged the EDN model, I came across numerous errors like the failure to assign a value. In constructing a model or building a design, you often use a signal as a flag to tell you when a task--such as loading a register--has been completed. After loading and checking this flag, you must provide some mechanism for resetting the flag so that the next time you check, you will be testing a new event. Several of my errors were of this type.

When you exit your car, locking the door reduces the risk of theft. Similarly, when you finish with a flag, returning it to its unused state lowers the risk of error.

One of the dangers of patching errors, either in hardware or software, is that the patches may affect the function of other operations. In fact, in fixing several problems, I often got so twisted around that I created more design errors than I could possibly fix, which emphasized the need for good backup procedures. Because I was conscientious about backing up, even after compiling and simulating I was able to restore previous versions of work without worrying about the errors I'd introduced.

One large problem in society in general and engineering in particular is emotional attachment. If we do something, we are loathe to throw it out and start over. So we apply patches, which often creates new problems and new demands for more patches. Sometimes it is better to admit our mistakes and start over.

This project offered several examples of that philosophy. Six months into the design, Bill Billowitch suggested that I was too far off target. His suggestion was to throw away the existing model and start over. Despite my investment and commitment to the model, I took his advice. Within three weeks, I bypassed many of the problems I had struggled with earlier.

For about a week, I battled with one particular procedure that implemented 16-bit arithmetic operations. I just couldn't seem to eliminate all of the errors, so I finally bit the bullet and rewrote the procedure. The rewrite had several interesting ramifications. I found several places where the original was wrong (looking at the wrong bits, incorrect calls of the two's-complement and magnitude type converters). More important, I found my coding skill had improved. The original procedure--aside from being wrong--was 219 lines long. The new procedure was 187 lines, using more efficient coding rather than different VHDL constructs. The rewrite took about two hours. Patching would have taken longer.

The most obvious problem in the 16-bit arithmetic procedure was my weakness in computer math. On several occasions, I got wrapped up in two's-complement math. I also had problems setting flags for half carries, carries, and overflow. Fortunately, the model ultimately seemed to solve these difficulties.

Many of the unusual problems I encountered with the test patterns got me thinking. In addition to expected behaviors, the Z80 test patterns demonstrate the pathological function of the original Z80. The Z80's designers had a severe transistor budget and made design decisions for two reasons: to conserve transistors and to perform functions. Some of the unusual side-effects are apparent in the test patterns. I had no such transistor restrictions, but I also didn't have the insights of the original designers. As a result, for the EDN model to implement many of the pathological behaviors of the original chip, I had to add transistors.

The need to match pathological behavior and my architectural decisions necessarily imbued EDN's Z80 with more transistors than the original device. The EDN model, given a little rework, also should have been able to operate significantly faster than the real Z80. As a simple example, because the Z80 uses a 4-bit ALU, our device, using a 16-bit ALU, theoretically could perform 16-bit arithmetic operations 4 x as fast as the original device. To pass the Z80 test program, I inserted lots of dead time into the state machines and instruction operations. Cleaning out this dead time could greatly enhance the performance of the CPU.

The pathological behavior was also apparent in a problem that had me stumped for a while. Zilog's test presented a seemingly innocuous interrupt that the test pattern indicated the CPU should take, but which my Z80 model ignored. The specification defines a 2-instruction delay between accepting an interrupt-enable instruction and physically enabling the interrupt. The test pattern sequenced an interrupt enable and, before the interrupt was actually enabled, a nonmaskable interrupt (NMI). Then, following the NMI

execution, the test program presented a maskable interrupt. The EDN model took the maskable interrupt. Unfortunately, the test program was verifying that the NMI disrupted the enabling of the maskable interrupts.

Another example of pathological behavior temporarily confused both me and Zilog. Several times toward the end of the test pattern, the test patterns and the model diverged (Fig 2). Each time, a 1-cycle reset pulse was ignored by both the actual Z80 and the model. Otherwise, the particular sequence of instructions wasn't consistent. In the first instance, the tester presents what appears to be an indexed rotate instruction to the Z80, which the model executed properly. The following instruction is a jump immediate (JUMP n) instruction, which the model had previously executed correctly. This instruction requires a 4-cycle opcode fetch and two 3-cycle memory reads. The tester further complicates the test by presenting an interrupt to the Z80 at the end of the first memory read. What confused us is that, rather than the memory read following the opcode fetch, the tester expected another opcode fetch. In addition, the tester thought the fetch would be from address 0000h.

Initially, I considered the possibility of a single-bit error in the instruction data in the test program. I immediately suspected a restart instruction (RST 0), which would get the program counter to 0000h and was one bit removed from the jump immediate (C3h to C7h). Unfortunately, restart instructions require three cycles to execute, so this explanation didn't seem appropriate. A phone call to Zilog wasn't any more illuminating.

Bill Billowitch suggested the problem might have been the result of sloppy microcoding. He saw a similar problem when he wrote a model for the 68000. In addition, he pointed out other processors that have had similar errors. Bill's examples included the 386, which MS-Windows distinguishes from a 286 by looking for a bug.

Without any better guesses as to the cause of these behaviors, I coded the functions into the model as particular sequences of instructions. I knew that since the Z80 is not a pipelined machine, the instruction sequence wasn't the likely culprit, but I wanted to bypass these functional failures and finish debugging the model. I speculated that the problem might result from a particular value in a register when the instruction is processed.

Later, Zilog told me of an undocumented "feature" of the Z80. If a short reset pulse comes into the processor during the M1 T1 cycle (the first clock cycle of an opcode fetch), the CPU will execute the instruction being fetched but will ignore the subsequent one and reset the program counter to 0000h. Adjusting the model to meet this behavior was relatively easy.

After writing and debugging the model (Fig 3), I sent a copy to Synopsys for comments on my approach and the model's synthesizability. The company's impression was that, although the model wasn't ideally suited for synthesis, it was generally workable. Synopsys anticipated spending a few days rewriting some portions of the model and taking a few weeks to synthesize and optimize the design. In the next issue of EDN, I'll discuss the steps Synopsys and I took to optimize and synthesize the model.

Simulators operate differently

VHDL analysis and simulation tools fall into two categories. Vantage's tools, like other compiler-based tools, require a host-based C compiler to compile your model into machine instructions for the host computer, much as a **software** compiler prepares a high-level-language program for execution. In contrast, interpretive simulators, such as the VHDL tool offered by Synopsys, generate an intermediate-language version that is read and executed by the computer. Which of the two approaches is better is a religious issue to the various camps. The two sides generally agree, however, that compiler-based tools execute the simulation faster though they require more time to prepare the files for simulation.

Religious arguments are always fun to listen to. However, since both sides are often partially correct, the issues are almost impossible to resolve accurately. Though I did get to use both Vantage and Synopsys tools to simulate the Z80 model, operating one simulator on a DN4500 with 16 Mbytes of RAM and the other on a SPARCstation 2 with 64 Mbytes of RAM invalidates any effective comparison. Following are the Vantage (compiled) and Synopsys (interpreted) perspectives on the debate, offered by John

Willey of Vantage and Jose Torres of Synopsys.

"An interpreter performs a quick scan of a language and generates pseudocode (intermediate language). A separate program later reads the pseudocode and executes each line sequentially. [As a result,] interpreters prepare the input quickly, but because a separate program processes each statement by reading and acting upon it, they generally execute for slower than compilers.

"A compiler performs multiple scans of the input language, ultimately translating it into machine instructions for the target CPU. The simulator then links the resulting code with the [simulation] kernel and some libraries for execution. Compilers take longer to prepare the input, but their output is executed en masse on the target machine.

"For small designs, we have found that the aggregate of preparation and execution time is shorter with interpreters than with compilers. The crossover point, however, is fairly low--we estimate around 15,000 to 20,000 gates before compiler-based preparation/execution times become shorter.

"Therefore, you might expect interpreters to excel in the early, behavioral portion of the design cycle where changes are many and execution times are small. You might also expect compilers to be faster as designs get larger and the number of simulation vectors increase. In practice, though, incremental compile features can minimize the time to make changes with a compiler, reducing the total time for a compiler to make a change and recompile. These features can make compilers as fast as interpreters, once the first full compilation is complete, while maintaining the performance benefits of compilers on larger designs."--John Willey, Vantage Analysis Systems.

"Compiled-code implementations generally translate from VHDL to C, compile the C code into object files, and then link the object files with the simulator to get an executable model for the design. Therefore, you must build a new executable file for each design or version of the design. In some implementations, if you want debugging capabilities, you must build a different executable. Also, because the executable is a C object executable by the hardware, [rather than the actual VHDL,] debugging capabilities for compiled implementations are generally less powerful than the ones provided by interpreted implementations.

"[There are major disadvantages to compiled approaches.] Linking the object files to the simulator can take a long time, therefore the turnaround time for design changes can be high. Also, since compiled approaches require a native C compiler to create an executable, you face the C compiler's limitations. Furthermore, compiled VHDL implementations often generate very large C files even for modest designs, limiting their capabilities on any particular workstation.

"Interpreted implementations generate pseudocode for a **virtual machine**--the simulator. The pseudocode is like an assembly language that the **virtual machine** executes (interprets). Since the simulator is the **virtual machine** that executes the pseudocode, there is no need to create an executable. [As a result, you don't have the linking problem inherent to compiled implementations.] Neither do you need a different simulator to enable debugging.

"A disadvantage of interpretive implementations is that optimization of the pseudocode may not be as efficient as that of native C compilers. Therefore, simulation performance of compiled implementations may be 2 to 3x for small designs. We have found that bench-marks can exploit the benefits of either approach."

Stupid VHDL tricks

Like writing the IF and END IF constructs before filling in the details of the conditional code, there are numerous techniques that you learn the hard way. None of these suggestions are revolutionary; due to product advances in some of the VHDL analyzers, some may no longer be necessary. Ignoring them won't cause heartache or project failure. However, using them may save you some time during debug.

1. When writing a procedure call, allow one line per signal or variable. The inevitable type and/or mode mismatches generate error messages that tell you the line number and number in the list. Would you like to try and find the 63rd variable in a list of more than 100?

2. When you use CASE statements, avoid putting the first CASE on the

same line as the WHEN. Although both are legal and will simulate and synthesize fine, doing so makes it difficult to set a breakpoint on acceptance of the CASE.

3. Keep your VHDL source files. Compiled VHDL tools keep compiled versions of your files. Several people at Vantage suggested using only these versions to avoid potential version-control problems. They recommended extracting a text file from the compiled version when you need to edit your source. The first problem I had was that I couldn't figure out how to extract the source file. The bigger problem is that when my workstation crashed during a compile, it corrupted the library. When it happened to me, the tool prompted me to use the "library-conversion utility" to correct the problem. Unfortunately, the documentation didn't offer any clues to this utility. Nor would the tool let me delete, purge, or otherwise cleanse the offending library--my working library containing our entire compiled Z80 model. My solution was to blow the library away with a directory delete. Had that been my only version of the model, I would have been dead.

4. Optimizing simulatable models can be contrary to optimizing a synthesizable one. For example, consider a model that looks like this: IF (a long list of frequently occurring constraints) THEN
a bunch of signal and variable assignments;
ELSIF (short list of less frequent conditions) THEN
a bunch of signal and variable assignments;
ELSIF (a short list of remaining rare conditions) THEN
a bunch of signal and variable assignments;
AND IF; This model is optimized for simulation. Because the frequent conditions are tested first, the simulator mostly executes only the first test; only the occurrence of the most infrequent conditions forces execution of all three tests. On the other hand, for synthesis, you end up with a big chunk of sum-of-products logic. Optimized for synthesis, the code would look like: IF (short list of less-frequent conditions) THEN
a bunch of signal and variable assignments;
ELSIF (a short list of rare conditions) THEN
a bunch of signal and variable assignments;
ELSE (the long list of oft-occurring constraints)
a bunch of signal and variable assignments; END IF;

5. In my state-machine model, I had several instances when operations didn't do anything in a particular state. Initially, I had used a test for the operations and a null state. I later rearranged the operation choices to move those null operations to the end of the list, and I completely removed the tests. In this way, the simulator doesn't execute any steps for these operations and, better, the synthesis **software** won't create any unnecessary logic.

6. Unless you have the horsepower and memory to handle it don't multitask memory- and CPU-intensive operations. As a small test, I challenged the DN 4500 and its 16 Mbytes of memory to compile a package and execute a 50- μ sec (real-time) simulation. Alone, the compile took 5 minutes and 7 sec; the 50- μ sec simulation took 43 sec to execute. Together, the compile took 9 minutes and 17 sec and the simulation took 2 minutes and 33 sec.

7. On the subject of horsepower and memory, don't underestimate the amount you'll need. One user estimated that the Vantage analyzer requires 70 Mbytes of swap space to compile a 12,000-line VHDL model. The Z80 model is on this order. Synthesis tool's needs are greater. Synthesis runs of EDN's Z80 model on a SPARCstation 2 with 48 Mbytes of dynamic RAM and 100 Mbytes of swap space crashed and burned. With Synopsys' (Mountain View, CA) help, I completed synthesis on a SPARCstation 2 with 64 Mbytes of memory and 250 Mbytes of swap space. I must qualify these warnings by telling you that Synopsys doesn't recommend synthesizing your model--as we did--as a monolithic block. However, no VHDL tools are designed to analyze or synthesize obese models on lightweight workstations.

Std-DevelopersKit

The Std-DevelopersKit is a group of model libraries that was introduced collectively in the middle of 1991. These libraries contain a litany of useful building blocks and design guidelines, providing timing, control, memory, and I/O functions for VHDL models. Serving as the behavioral cornerstone in such well-known designs as the Intel P5 and the

F22 Advanced Tactical Fighter, the \$9900/site package is the brainchild of the VHDL Technology Group. EDN used version 1.0 of the **software** --version 2.0 is the present release.

VHDL Technology Group, 100 Brodhead, Rd, Suite 140, Bethlehem, PA 18017. Phone (215) 882-3130. FAX (215) 882-3133. Circle No.316

Vantage Spreadsheet

Vantage Spreadsheet burst on the VHDL scene in February of 1989 through the efforts of David Coelho, Rick Lazansky, Cary Usery, Tom Miller, Kelly Foster, and Bob Donnely. The Vantage Spreadsheet VHDL behavioral and structural model simulator has been a part of such projects as the Intel P5 [mu]P, the Silicon Graphics Iris workstation, and the Lockheed/Sanders F22 cockpit display. although EDN used version 3.1 of the **software** for the design, Vantage Spreadsheet 4.0 has been available since June 1992. A license for the **software** costs \$44,000 and includes a **floating -license manager**; Debug 1076, the source-level debugger; VCC, a compiler that allows the **software** to distribute the source-code compilation over available workstations on a network; import and export utilities; and a schematic editor/viewer, which allows incremental design changes to reflect in the simulation. Vantage Analysis Systems was recently acquired by Viewlogic Systems (Marlboro, MA).

Vantage Analysis Systems Inc, 42808 Christy St, Suite 200, Fremont, CA 94538. Phone (510) 649-0901. FAX (510) 569-0129. Circle No. 315

Reference

[1.] IEEE Standard VHDL Language Reference Manual, IEEE Std 1076-1987, Institute of Electrical and Electronics Engineers Inc, New York, 1988.

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SPECIAL FEATURES: illustration; chart

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?s (partition or partitioned) and (license (w) manager) and software and (floating (w) license)

60783	PARTITION
23836	PARTITIONED
897828	LICENSE
4178522	MANAGER
1043	LICENSE(W)MANAGER
6097440	SOFTWARE
247997	FLOATING
897828	LICENSE
1398	FLOATING(W)LICENSE
S12	2 (PARTITION OR PARTITIONED) AND (LICENSE (W) MANAGER) AND SOFTWARE AND (FLOATING (W) LICENSE)

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DIALOG(R)File 15:ABI/Inform(R)

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Does licensing require new access control techniques?

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ABSTRACT: The **software** licensing problem is analyzed in detail and a mid- or long-term solution is proposed on this analytical basis. There are 2 general approaches to controlling **software** usage by means of licenses: consumptive and allocative schemes. Consumptive schemes can use either some form of electronic money for prepayment or a trusted logging mechanism to bill the customer afterward, similar to the logging mechanisms used in database technology. Allocative schemes restrict usage in real time to a maximum number of concurrent users. Licensing is related to current access control (AC) techniques and the evolution of actual licensing schemes is

Consider all